United States Department of Agriculture

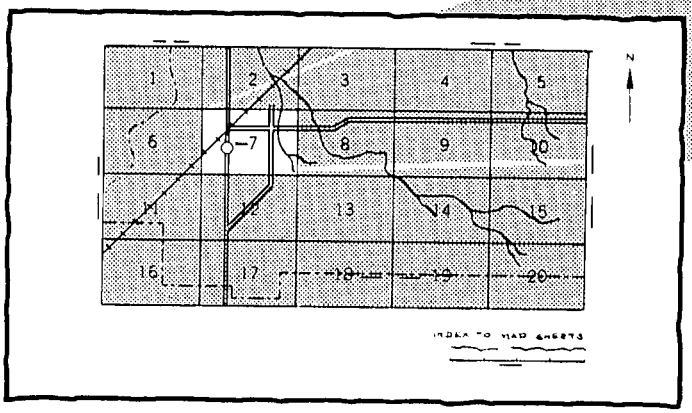
Soil Conservation Service

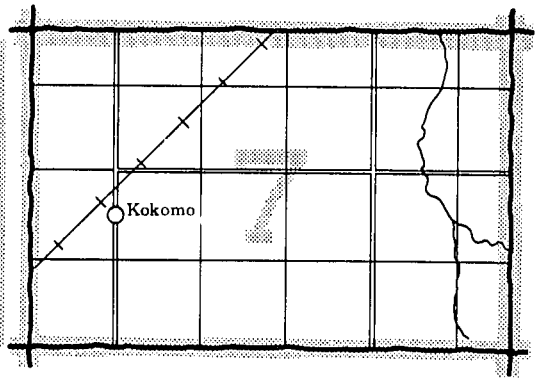
In cooperation with United States Department of Agriculture, Forest Service, and Arkansas Agricultural Experiment Station

Soil Survey of Cleburne and Van Buren Counties, Arkansas

HOW TO USE

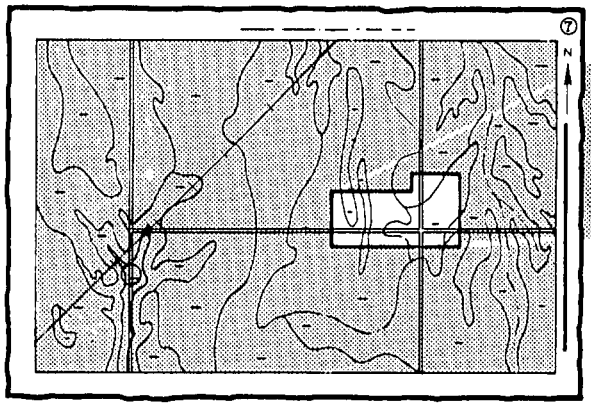
1. Locate your area of interest on the "Index to Map Sheets"

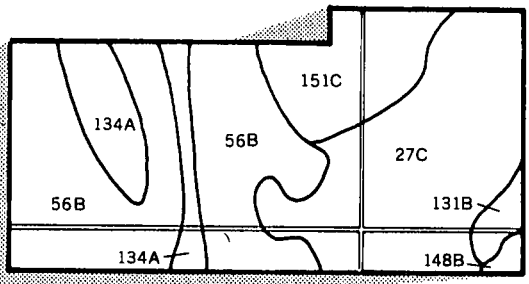




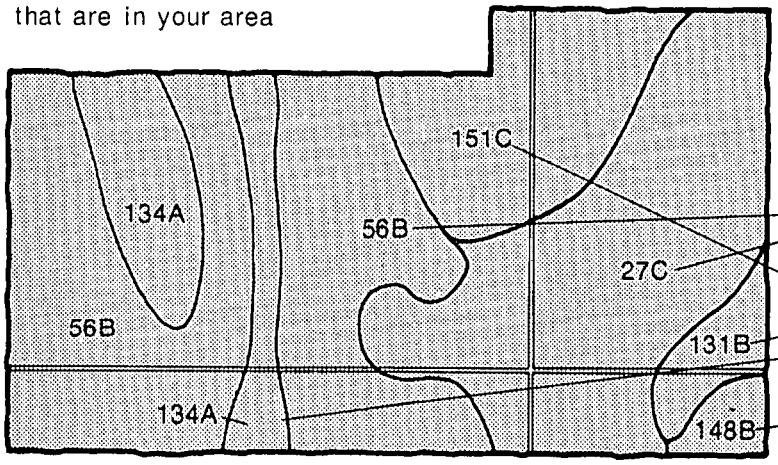
2. Note the number of the map sheet and turn to that sheet.

3. Locate your area of interest on the map sheet.





4. List the map unit symbols that are in your area

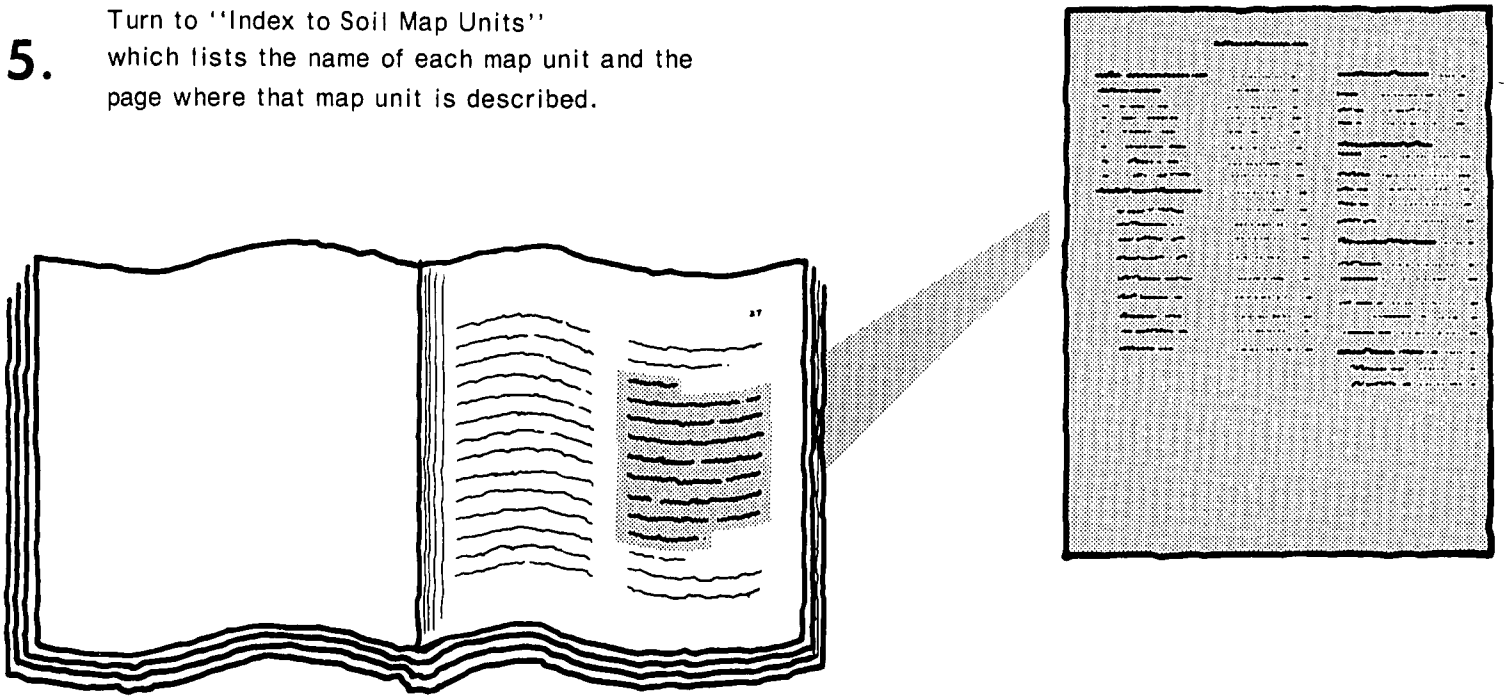


Symbols

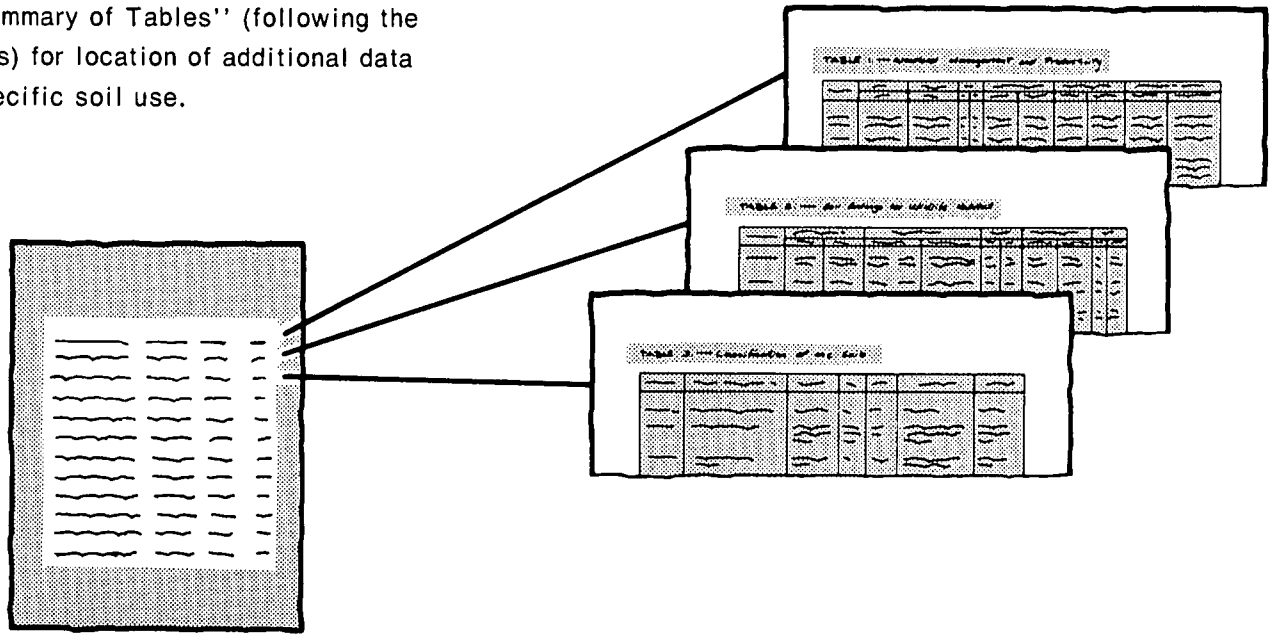
27C
56B
131B
134A
148B
151C

THIS SOIL SURVEY

5. Turn to "Index to Soil Map Units" which lists the name of each map unit and the page where that map unit is described.



6. See "Summary of Tables" (following the Contents) for location of additional data on a specific soil use.



7. Consult "Contents" for parts of the publication that will meet your specific needs. This survey contains useful information for farmers or ranchers, foresters or agronomists; for planners, community decision makers, engineers, developers, builders, or homebuyers; for conservationists, recreationists, teachers, or students; for specialists in wildlife management, waste disposal, or pollution control.

This soil survey is a publication of the National Cooperative Soil Survey, a joint effort of the United States Department of Agriculture and other federal agencies, state agencies including the Agricultural Experiment Stations, and local agencies. The Soil Conservation Service has leadership for the federal part of the National Cooperative Soil Survey. In line with Department of Agriculture policies, benefits of this program are available to all, regardless of race, color, national origin, sex, religion, marital status, or age.

Major fieldwork for this soil survey was completed in 1983. Soil names and descriptions were approved in 1983. Unless otherwise indicated, statements in this publication refer to conditions in the survey area in 1983. This soil survey was made cooperatively by the Soil Conservation Service, U.S. Department of Agriculture, Forest Service, and the Arkansas Agricultural Experiment Station. It is part of the technical assistance furnished to the Cleburne County Conservation District and the Van Buren County Conservation District.

Soil maps in this survey may be copied without permission. Enlargement of these maps, however, could cause misunderstanding of the detail of mapping. If enlarged, maps do not show the small areas of contrasting soils that could have been shown at a larger scale.

Cover: Greers Ferry Lake, which covers approximately 33,000 acres in Cleburne and Van Buren Counties, provides flood control and recreation activities and is a source for domestic water supply.

Contents

Soil Series

Issued July 1986

Index to Map Units

Summary of Tables

Foreword

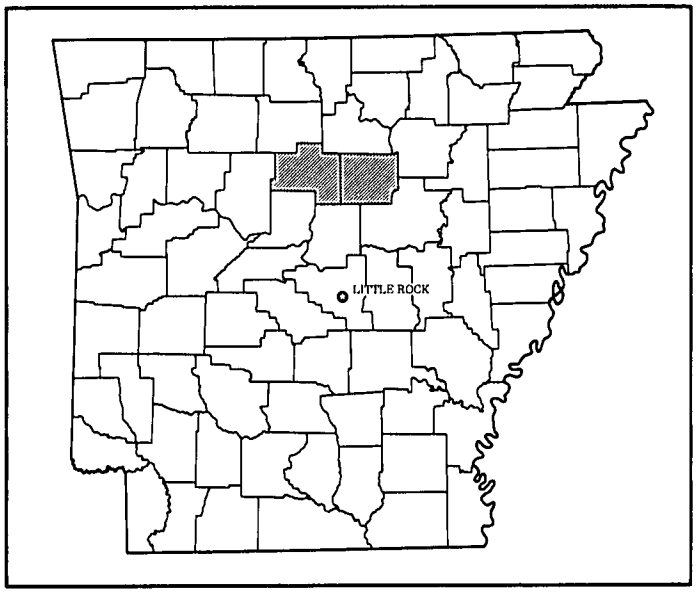
This soil survey contains information that can be used in land-planning programs in Cleburne and Van Buren Counties. It contains predictions of soil behavior for selected land uses. The survey also highlights limitations and hazards inherent in the soil, improvements needed to overcome the limitations, and the impact of selected land uses on the environment.

This soil survey is designed for many different users. Farmers, foresters, and agronomists can use it to evaluate the potential of the soil and the management needed for maximum food and fiber production. Planners, community officials, engineers, developers, builders, and home buyers can use the survey to plan land use, select sites for construction, and identify special practices needed to insure proper performance. Conservationists, teachers, students, and specialists in recreation, wildlife management, waste disposal, and pollution control can use the survey to help them understand, protect, and enhance the environment.

Great differences in soil properties can occur within short distances. Some soils are seasonally wet or subject to flooding. Some are shallow to bedrock. Some are too unstable to be used as a foundation for buildings or roads. Clayey or wet soils are poorly suited to use as septic tank absorption fields. A high water table makes a soil poorly suited to basements or underground installations.

These and many other soil properties that affect land use are described in this soil survey. Broad areas of soils are shown on the general soil map. The location of each soil is shown on the detailed soil maps. Each soil in the survey area is described. Information on specific uses is given for each soil. Help in using this publication and additional information are available at the local office of the Soil Conservation Service or the Cooperative Extension Service.

Jack C. Davis
State Conservationist
Soil Conservation Service



Location of Cleburne and Van Buren Counties in Arkansas.

Soil Survey of
Cleburne and Van Buren Counties, Arkansas

by William R. Townsend, Kenneth J. Crader, Cornelius Harris, and
Johnny D. Chism, Soil Conservation Service, and
Emanuel Hudson and Jim Harriman, Forest Service

United States Department of Agriculture, Soil Conservation Service

in cooperation with United States Department of Agriculture, Forest Service, and the
Arkansas Agricultural Experiment Station

CLEBURNE and VAN BUREN COUNTIES adjoin one another in the north-central part of Arkansas.

Cleburne County is roughly square. It is about 24 miles from north to south and about 26 miles from east to west. Cleburne County has a total area of 378,822 acres, or about 592 square miles. This includes 23,701 acres of large bodies of water, mostly in Greers Ferry Lake. The total land area is 355,121 acres. The county is bounded on the north by Stone and Independence Counties, on the south by Faulkner and White Counties, on the east by Independence and White Counties, and on the west by Van Buren County.

In 1980 the population of Cleburne County was 17,981. In Heber Springs, the county seat, the population was 5,000. In other important trading centers, such as Quitman, the population was 399; Greers Ferry, 482; and in Concord, 184.

The economy of Cleburne County is based mainly on farming. Except for a few manufacturing plants in Heber Springs, the local businesses provide local services. Urban expansion is proceeding rapidly in the Greers Ferry Lake area.

Van Buren County is roughly rectangular. It runs about 24 miles from north to south and about 32 miles from east to west. Van Buren County has a total area of 463,443 acres, or about 724 square miles. This includes 9,472 acres of large bodies of water, mostly in Greers Ferry Lake. The total land area is 453,971 acres. The county is bounded on the north by Searcy and Stone Counties, on the south by Conway and Faulkner Counties, on the east by Cleburne County, and on the west by Pope County.

In 1980 the population of Van Buren County was 13,357. In Clinton, the county seat, the population was 1,284. In other important trading centers, such as Fairfield Bay, the population was 1,000; in Shirley, 354; in Damascus, 172; and in Bee Branch, 100.

The economy of Van Buren County is based mainly on farming and timber production. Except for a few manufacturing plants near Clinton, the local businesses provide local services. Urban expansion is proceeding rapidly in the Greers Ferry Lake area.

General Nature of the Survey Area

This section discusses farming, physiography and drainage, and the climate in Cleburne and Van Buren Counties.

Farming

Settlers came to Cleburne and Van Buren Counties in the early 1800's. Cleburne County was formed in 1883 from parts of Independence, Van Buren, and White Counties. It was named for Patrick R. Cleburne, a major general in the Confederate Army. Van Buren County was formed in 1833 from parts of Conway, Independence, and Izard Counties. It was named for Martin Van Buren, then Vice President of the United States.

Farming in both counties began on soils that had good natural drainage. These soils are in high positions near the flood plain of the Little Red River and its tributaries and on hills and in valleys. Most of the better soils along these flood plains and upland flats were cleared for farming, and the areas of steep, stony soils were left wooded. Cotton was the main cash crop. The major farming changed from a row crop system of cotton, corn, and other tilled crops to grass and pasture. The main farming area is now along the protected area below Greers Ferry Dam.

Most recently farming has become more diversified (fig. 1) and generally less intensive. Dairy herds, beef cattle, hogs, and poultry provide most of the farm income in the area of ridges, upland flats, and valleys. Some farms have a small acreage of orchards, vegetables, strawberries, or a combination of these.

Farms in Cleburne and Van Buren Counties are decreasing in number and increasing in size based on data compiled by the Cleburne County and Van Buren County Development Councils. Between 1950 and 1980, the number of farms in Cleburne County decreased from 1,700 to 708, and the average farm size increased from 137 to 179 acres. In Van Buren County during the same period, the number of farms decreased from 2,000 to 558, and the average farm size increased from 131 to 228 acres. Most of the better farmland in these counties was inundated by Greers Ferry Lake. The best farmland is now along the Little Red River below Greers Ferry Dam. On these bottom lands, soybeans are the main crop, but grain sorghum and winter small grains are also grown.

Figure 1.—Farming in the survey area has become more diversified and generally less intensive. Pasture and hay are the main crops, and a few areas are used for cultivated row crops.

Figure 2.—Most of the soils in the survey area formed in material derived from interbedded sandstone, siltstone, and shale.

Physiography and Drainage

The Boston Mountains area is in the northern part of Cleburne and Van Buren Counties. This area is characterized by broad, gently sloping to rolling mountaintops and steep to very steep mountainsides. The mountaintops are generally capped with hard sandstone, and the mountainsides are typically interbedded sandstone, siltstone, and shale (fig. 2). The main soils in this area are the Enders, Mountainburg, Nella, and Steprock soils.

The Arkansas Valley and Ridges area is in the southern part of Cleburne and Van Buren Counties. This area is characterized by rolling hills, narrow ridges, and broad valleys (fig. 3). The tops of the hills and ridges are generally capped with sandstone, and the sides are typically interbedded sandstone, siltstone, and shale. The main soils in this area are the Linker, Mountainburg, and Steprock soils.

The drainage in Cleburne County is generally toward the south and east except for an area in the southwestern corner of the county. In the northern part of Cleburne County, the natural drainage system consists of many intermittent and perennial streams. These streams mainly drain into Greers Ferry Lake or the Little Red River below Greers Ferry Dam. In a few areas, they drain into streams in Stone County on the north and Independence County on the east. The Little Red River flows east and enters White County at a point near Pangburn in White County, and it serves as a boundary between Cleburne County and White County for about 3 miles. In the southeastern part of the county, the drainage is mainly through a series of natural drainageways that flow into Big Creek. These drainageways enter White County at a point in the southeastern corner of Cleburne County and flow into

Figure 3.—A typical landscape setting is in the Arkansas Valley and Ridges area, which is characterized by rolling hills, narrow ridges, and broad valleys.

the Little Red River at a point in White County. Drainage in the southwestern part of the county is mainly through a series of natural drainageways. These drain into Cadron Creek, which enters Van Buren County in the southwestern corner of the county.

The drainage in Van Buren County is generally toward the south and east. In the northern part of the county, the natural drainage system consists of many intermittent and perennial streams. These drain mostly into the South Fork and Middle Fork of the Little Red River, both of which flow into Greers Ferry Lake. Cadron Creek is a major drainageway in the southeastern part of Van Buren County and flows into the Arkansas River at a southern point in Faulkner County. Other small drainageways also flow south into Faulkner County. The East Fork and West Fork of Point Remove Creek, Brock Creek, and Drivers Creek are major drainageways in the southwestern part of the county, and they drain into the Arkansas River at a southern point in Conway County.

Domestic water sources are Greers Ferry Lake, the Little Red River, and drilled or dug wells and springs. Water sources for livestock are mainly from farm ponds and creeks.

Climate

Prepared by the National Climatic Center, Asheville, North Carolina.

Table 1 gives data on temperature and precipitation for the survey area as recorded at Greers Ferry Dam, Arkansas, in the period 1951 to 1980. Table 2 shows probable dates of the first freeze in fall and the last freeze in spring. Table 3 provides data on length of the growing season.

In winter the average temperature is 38 degrees F, and the average daily minimum temperature is 26 degrees. The lowest temperature on record, which occurred at Greers Ferry Dam, Arkansas, on January 1, 1977, is -4 degrees. In summer the average temperature is 78 degrees, and the average daily maximum temperature is 90 degrees. The highest recorded temperature, which occurred at Greers Ferry Dam, Arkansas, on August 1, 1980, is 111 degrees.

Growing degree days are shown in table 1. They are equivalent to "heat units." During the month, growing degree days accumulate by the amount that the average temperature each day exceeds a base temperature (50 degrees F). The normal monthly accumulation is used to schedule single or successive plantings of a crop between the last freeze in spring and the first freeze in fall.

The total annual precipitation is about 51 inches. Of this, 27 inches, or about 53 percent, usually falls in April through September. The growing season for most crops falls within this period. In 2 years out of 10, the rainfall in April through September is less than 22 inches. The heaviest 1-day rainfall during the period of record was 5.5 inches at Greers Ferry Dam on July 24, 1971. Thunderstorms occur on about 56 days each year, and most occur in summer.

The average seasonal snowfall is 4 inches. The greatest snow depth at any one time during the period of record was 9 inches. On an average, 1 day has at least 1 inch of snow on the ground. The number of such days varies from year to year.

The average relative humidity in midafternoon is about 55 percent. Humidity is higher at night, and the average at dawn is about 80 percent. The sun shines 70 percent of the time possible in summer and 50 percent in winter. The prevailing wind is from the southwest. Average windspeed is highest, 10 miles per hour, in spring.

How This Survey Was Made

This survey was made to provide information about the soils in the survey area. The information includes a description of the soils and their location and a discussion of the suitability, limitations, and management of the soils for specified uses. Soil scientists observed the steepness, length, and shape of slopes; the general pattern of drainage; the kinds of crops and native plants growing on the soils; and the kinds of bedrock. They dug many holes to study the soil profile, which is the sequence of natural layers, or horizons, in a soil. The profile extends from the surface down into the parent material from which the soil formed. The parent material is devoid of roots and other living organisms and has not been changed by other biological activity.

The soils in the survey area occur in an orderly pattern that is related to the geology, the landforms, relief, climate, and the natural vegetation of the area. Each kind of soil is associated with a particular kind of landscape or with a segment of the landscape. By observing the soils in the survey area and relating their position to specific segments of the landscape, a soil scientist develops a concept, or model, of how the soils were formed. Thus, during mapping, this model enables the soil scientist to predict with considerable accuracy the kind of soil at a specific location on the landscape.

Commonly, individual soils on the landscape merge into one another as their characteristics gradually change. To construct an accurate soil map, however, soil scientists must determine the boundaries between the soils. They can observe only a limited number of soil profiles. Nevertheless, these observations, supplemented by an understanding of the soil-landscape relationship, are sufficient to verify predictions of the kinds of soil in an area and to determine the boundaries.

Soil scientists recorded the characteristics of the soil profiles that they studied. They noted soil color, texture, size and shape of soil aggregates, kind and amount of rock fragments, distribution of plant roots, acidity, and other features that enable them to identify soils. After describing the soils in the survey area and determining their properties, the soil scientists assigned the soils to taxonomic classes (units). Taxonomic classes are concepts. Each taxonomic class has a set of soil characteristics with precisely defined limits. The classes are used as a basis for comparison to classify soils systematically. The system of taxonomic classification used in the United States is based mainly on the kind and character of soil properties and the arrangement of horizons within the profile. After the soil scientists classified and named the soils in the survey area, they compared the individual soils with similar soils in the same taxonomic class in other areas so that they could confirm data and assemble additional data based on experience and research.

While a soil survey is in progress, samples of some of the soils in the area are generally collected for laboratory analyses and for engineering tests. Soil scientists interpreted the data from these analyses and tests as well as the field-observed characteristics and the soil properties in terms of expected behavior of the soils under different uses. Interpretations for all of the soils were field tested through observation of the soils in different uses under different levels of management. Some interpretations are modified to fit local conditions,

and new interpretations sometimes are developed to meet local needs. Data were assembled from other sources, such as research information, production records, and field experience of specialists. For example, data on crop yields under defined levels of management were assembled from farm records and from field or plot experiments on the same kinds of soil.

Predictions about soil behavior are based not only on soil properties but also on such variables as climate and biological activity. Soil conditions are predictable over long periods of time, but they are not predictable from year to year. For example, soil scientists can state with a fairly high degree of probability that a given soil will have a high water table within certain depths in most years, but they cannot assure that a high water table will always be at a specific level in the soil on a specific date.

After soil scientists located and identified the significant natural bodies of soil in the survey area, they drew the boundaries of these bodies on aerial photographs and identified each as a specific map unit. Aerial photographs show trees, buildings, fields, roads, and rivers, all of which help in locating boundaries accurately.

Map Unit Composition

A map unit delineation on a soil map represents an area dominated by one major kind of soil or an area dominated by several kinds of soil. A map unit is identified and named according to the taxonomic classification of the dominant soil or soils. Within a taxonomic class there are precisely defined limits for the properties of the soils. On the landscape, however, the soils are natural objects. In common with other natural objects, they have a characteristic variability in their properties. Thus, the range of some observed properties may extend beyond the limits defined for a taxonomic class. Areas of soils of a single taxonomic class rarely, if ever, can be mapped without including areas of soils of other taxonomic classes. Consequently, every map unit is made up of the soil or soils for which it is named and some soils that belong to other taxonomic classes. In the detailed soil map units, these latter soils are called inclusions or included soils. In the general soil map units, they are called soils of minor extent.

Most inclusions have properties and behavioral patterns similar to those of the dominant soil or soils in the map unit, and thus they do not affect use and management. These are called noncontrasting (similar) inclusions. They may or may not be mentioned in the map unit descriptions. Other inclusions, however, have properties and behavior divergent enough to affect use or require different management. These are contrasting (dissimilar) inclusions. They generally occupy small areas and cannot be shown separately on the soil maps because of the scale used in mapping. The inclusions of contrasting soils are mentioned in the map unit descriptions. A few inclusions may not have been observed, and consequently are not mentioned in the descriptions, especially where the soil pattern was so complex that it was impractical to make enough observations to identify all of the kinds of soils on the landscape.

The presence of inclusions in a map unit in no way diminishes the usefulness or accuracy of the soil data. The objective of soil mapping is not to delineate pure taxonomic classes of soils but rather to separate the landscape into segments that have similar use and management requirements. The delineation of such landscape segments on the map provides sufficient information for the development of resource plans, but onsite investigation is needed to plan for intensive uses in small areas.

General Soil Map Units

The general soil map at the back of this publication shows broad areas that have a distinctive pattern of soils, relief, and drainage. Each map unit on the general soil map is a unique natural landscape. Typically, a map unit consists of one or more major soils and some minor soils. It is named for the major soils. The soils making up one unit can occur in other units but in a different pattern.

The general soil map can be used to compare the suitability of large areas for general land uses. Areas of suitable soils can be identified on the map. Likewise, areas where the soils are not suitable can be identified.

Because of its small scale, the map is not suitable for planning the management of a farm or field or for selecting a site for a road or a building or other structure. The soils in any one map unit differ from place to place in slope, depth, drainage, and other characteristics that affect management.

The soils in the survey area vary widely in their suitability for major land uses. Soil suitability ratings are based on the practices commonly used in the survey area to overcome soil limitations. These ratings reflect the ease of overcoming the limitations. They also reflect the problems that will persist even if such practices are used.

Each map unit is rated for *cultivated crops, pasture, woodland*, and *urban uses*. Cultivated crops are those grown extensively in the survey area. Pasture crops are those grown for livestock forage production. Woodland refers to areas of native or introduced trees. Urban uses include residential, commercial, and industrial developments.

Soil Descriptions for Cleburne County

1. Enders-Steprock

Deep and moderately deep, well drained, moderately sloping to steep, gravelly and stony, loamy soils that formed in residual and colluvial material derived from shale or interbedded sandstone, siltstone, and shale

This map unit is throughout Cleburne County. The soils are on the sides and tops of hills, mountains, and ridges.

This map unit makes up about 35 percent of the county. It is about 30 percent Enders soils, 30 percent Steprock soils, and 40 percent soils of minor extent.

The deep Enders soils are on the sides and tops of hills, mountains, and ridges. They have a surface layer of very dark grayish brown gravelly or stony fine sandy loam. The subsoil is typically red silty clay or clay; red, mottled clay; and mottled red and gray shaly silty clay. The underlying material is gray, partly weathered shale.

The moderately deep Steprock soils are on the sides of hills, mountains, and ridges. They have a surface layer of dark brown gravelly and stony fine sandy loam. The subsoil is strong brown gravelly loam and yellowish red very gravelly loam. The underlying material is yellowish red, partly weathered sandstone.

The soils of minor extent in this map unit are the moderately deep Linker soils and the shallow Mountainburg soils on the upper part of side slopes and on benches and ridgetops; and the deep Nella soils on lower side slopes and in other colluvial positions. Also included are small areas of rock outcrop.

The soils in this map unit are used mainly as woodland. In some of the less sloping areas, they are used as pasture or range. In some areas, they are used for urban development.

These soils are generally poorly suited to unsuited to cultivated crops and moderately suited to unsuited to pasture. The potential productivity of these soils for woodland is moderate. Slope, surface stones, and the hazard of erosion are the main limitations to the use of these soils for cultivated crops, pasture, and woodland. These soils also have moderate to severe limitations for most urban uses. High shrink-swell potential and slope are the main limitations of Enders soils. Depth to rock and slope are the main limitations of Steprock soils.

2. Steprock-Mountainburg-Rock outcrop

Moderately deep and shallow, well drained, steep to very steep, stony and loamy soils that formed in colluvium or residuum of sandstone or interbedded sandstone, siltstone, and shale; and Rock outcrop

This map unit is throughout Cleburne County. The soils are mainly on the sides of mountains and ridges.

This map unit makes up about 10 percent of the county. It is about 40 percent Steprock soils, 25 percent Mountainburg soils, 15 percent Rock outcrop, and 20 percent soils of minor extent.

The moderately deep Steprock soils are on the sides of mountains and ridges. They have a surface layer of dark brown stony fine sandy loam. The subsoil is strong brown gravelly loam and yellowish red very gravelly

loam. The underlying material is yellowish red, weathered sandstone.

The shallow Mountainburg soils are on the sides of mountains and ridges. They have a surface layer of very dark grayish brown stony fine sandy loam and a subsurface layer of yellowish brown stony fine sandy loam. The subsoil is typically strong brown very gravelly sandy clay loam. The underlying material is hard, massive, sandstone bedrock.

Rock outcrop is mostly on ledges, but it is also intermingled with the soils on the landscape.

The soils of minor extent in this map unit are the deep Enders and Nella soils on sides of mountains and ridges and the deep Ceda and Kenn soils on narrow flood plains.

The soils in this map unit are used mainly for woodland. In a few areas, they are used for urban development.

These soils are generally unsuited to cultivated crops and are severely limited for pasture. The potential productivity of these soils for woodland is moderate to low. Slope, surface stones, the hazard of erosion, and Rock outcrop are the main limitations to the use of these soils. These soils have severe limitations for most urban uses. Slope, surface stones, Rock outcrop, and depth to bedrock are the main limitations for urban uses.

3. Linker-Steprock-Mountainburg

Moderately deep to shallow, well drained, gently sloping to moderately steep, loamy and gravelly soils that formed in residuum of sandstone or interbedded sandstone, siltstone, and shale

This map unit is throughout Cleburne County. The soils are on the sides and tops of hills and ridges.

This map unit makes up about 35 percent of the county. It is about 35 percent Linker soils, 25 percent Steprock soils, 10 percent Mountainburg soils, and 30 percent soils of minor extent.

The moderately deep Linker soils are on hillsides, ridgetops, and benches. They have a surface layer of dark brown gravelly fine sandy loam. The subsoil is strong brown gravelly loam and yellowish red loam and sandy clay loam. The underlying material is hard, level-bedded sandstone.

The moderately deep Steprock soils are on sides of hills and ridges. They have a surface layer of dark brown gravelly fine sandy loam. The subsoil is strong brown gravelly loam and yellowish red very gravelly loam. The underlying material is yellowish red, weathered sandstone.

The shallow Mountainburg soils are on benches and tops of hills and ridges. They have a surface layer of very dark grayish brown gravelly fine sandy loam and a subsurface layer of yellowish brown gravelly fine sandy loam. The subsoil is strong brown very gravelly sandy clay loam. The underlying material is hard, massive, sandstone bedrock.

The soils of minor extent in this map unit are the deep Enders and Nauvoo soils on the sides and tops of hills and ridges, and the deep, moderately well drained Sidon soils on plateaus and benches.

The soils in this map unit are used mainly for pasture and woodland. In some areas, they are in urban use.

These soils are moderately suited to unsuited to cultivated crops. Slope, hazard of erosion, and gravel on the surface are the main limitations. These soils are well suited to poorly suited to pasture depending on slope. The potential productivity of these soils for woodland is moderate to low. These soils are moderately suited to poorly suited to most urban uses. Depth to bedrock and slope are the main limitations for urban uses.

4. Steprock-Mountainburg

Moderately deep and shallow, well drained, gently sloping to moderately steep, stony and gravelly, loamy soils that formed in colluvium or residuum of sandstone or interbedded sandstone, siltstone, and shale

This map unit is throughout Cleburne County. The soils are mainly on the sides and tops of hills, mountains, and ridges.

This map unit makes up about 15 percent of the county. It is about 40 percent Steprock soils, 35 percent Mountainburg soils, and 25 percent soils of minor extent.

The moderately deep Steprock soils are on the sides of hills, mountains, and ridges. They have a surface layer of dark brown gravelly or stony fine sandy loam. The subsoil is strong brown gravelly loam and yellowish red very gravelly loam. The underlying material is yellowish red, weathered sandstone.

The shallow Mountainburg soils are on the sides and tops of hills, mountains, and ridges. They have a surface layer of very dark grayish brown gravelly or stony fine sandy loam and a subsurface layer of yellowish brown gravelly or stony fine sandy loam. The subsoil is strong brown very gravelly sandy clay loam. The underlying material is hard, massive, sandstone bedrock.

The soils of minor extent in this map unit are the deep Enders and Nella soils and the moderately deep Linker soils on the sides of hills, mountains, and ridges and the deep Ceda and Kenn soils on flood plains. Also included are areas of rock outcrop.

The soils in this map unit are used mainly for pasture and as woodland. In a few areas, the soils are used for urban development.

These soils are poorly suited to unsuited to cultivated crops and moderately suited to poorly suited to pasture. The potential productivity of these soils for woodland is moderate to low. Slope, surface stones, hazard of erosion, and rock outcrop are the main limitations. These soils are moderately suited to poorly suited to most urban uses. Slope, surface stones, rock outcrop, and depth to bedrock are the main limitations to urban uses.

5. Kenn-Ceda-Spadra

Deep, well drained, level to nearly level, loamy and gravelly soils that formed in alluvium

This map unit is in the southeastern part of Cleburne County. Kenn and Ceda soils are typically on narrow flood plains, and Spadra soils are on terraces at slightly higher elevations.

This map unit makes up about 2 percent of the county. It is about 40 percent Kenn soils, 25 percent Ceda soils, 25 percent Spadra soils, and 10 percent soils of minor extent.

Kenn soils typically have a surface layer of brown loam. The subsoil is yellowish red gravelly and very gravelly sandy clay loam. The underlying material is strong brown very gravelly fine sandy loam.

Ceda soils typically have a surface layer of very dark grayish brown gravelly loam. The underlying material is dark brown and brown very gravelly loam.

Spadra soils typically have a surface layer of dark brown loam. The subsoil is brown loam and brown fine sandy loam. The underlying material is reddish brown fine sandy loam.

The soils of minor extent in this map unit are the moderately well drained Barling soils on adjacent flood plains, the poorly drained Guthrie soils on upland flats and in depressions, and the moderately well drained Leadvale soils and the somewhat poorly drained Taft soils on terraces.

The soils in this map unit are used mainly as pasture and woodland. In several areas, the Spadra soils also are used for cultivated crops.

Kenn and Ceda soils have severe limitations for cultivated crops. These soils are moderately suited to pasture. Spadra soils are well suited to cultivated crops or pasture. Frequent flooding and low available water capacity are the main limitations to use of Kenn and Ceda soils for cultivated crops and pasture. Occasional flooding is a slight to moderate hazard for cultivated crops and pasture on Spadra soils. The potential productivity of the soils in this map unit for woodland is moderately high to high. The soils in this map unit are poorly suited or severely limited for most urban uses because of the flood hazard.

6. Spadra-Dela

Deep, well drained, level to gently sloping soils that formed in loamy and sandy alluvium

This map unit is along Little Red River below Greers Ferry Dam in Cleburne County. Spadra soils are on stream terraces, and Dela soils are on natural levees nearer to stream channels.

This map unit makes up about 1 percent of Cleburne County. It is about 50 percent Spadra soils, 20 percent Dela soils, and 30 percent soils of minor extent.

Spadra soils typically have a surface layer of dark brown loam. The subsoil is brown loam and brown fine sandy loam. The underlying material is reddish brown fine sandy loam.

Dela soils typically have a surface layer of dark brown and brown loamy fine sand. The underlying material is strong brown and yellowish brown, stratified fine sandy loam and loamy fine sand with thin strata of finer textures.

The soils of minor extent in this map unit are the moderately well drained Barling soils on flood plains and the somewhat poorly drained Taft soils on terraces and in depressions.

The soils in this map unit are well suited to pasture, and this is the main use. These soils are moderately suited to cultivated crops. Erosion is a moderate limitation in nearly level to gently sloping areas if cultivated crops are grown. These soils are normally protected from flooding by Greers Ferry Dam; they are subject to rare flooding under abnormal conditions, however, so they are considered to have limitations for most urban uses.

7. Leadvale-Taft

Deep, moderately well drained and somewhat poorly drained, level to gently sloping, loamy soils that formed in loamy material

This map unit is in the southern part of Cleburne County. Leadvale soils are on foot slopes and terraces. Taft soils are on stream terraces, on upland flats, and in depressions on slightly lower elevations.

This map unit makes up about 2 percent of the county. It is about 60 percent Leadvale soils, 20 percent Taft soils, and 20 percent soils of minor extent.

The moderately well drained Leadvale soils typically have a surface layer of brown silt loam. The subsoil is yellowish brown silty clay loam; yellowish brown, mottled silty clay loam; and mottled yellowish brown and gray silty clay loam.

The somewhat poorly drained Taft soils typically have a dark grayish brown silt loam surface layer and a pale brown silt loam subsurface layer. The subsoil is yellowish brown, mottled silt loam; light yellowish brown, mottled silt loam and silty clay loam; and yellowish red, mottled silty clay loam.

The soils of minor extent in this map unit are the moderately well drained Barling soils on flood plains, the moderately well drained Cane soils on toe slopes, the poorly drained Guthrie soils on upland flats and in depressions, and the well drained Spadra soils on terraces.

The soils in this map unit are used mainly as pasture. A few small tracts are in woodland.

These soils are moderately suited to cultivated crops and are well suited to pasture and woodland. Erosion is the main limitation on Leadvale soils, and wetness is the main limitation on Taft soils. These soils are moderately

suited to poorly suited to most urban uses. Wetness is the main limitation.

Soil Descriptions for Van Buren County

1. Enders-Steprock-Nella

Deep and moderately deep, well drained, moderately sloping to steep, gravelly and stony, loamy soils that formed in residual and colluvial material derived from shale or interbedded sandstone, siltstone, and shale

This map unit is throughout Van Buren County. The soils are on the sides and tops of hills, mountains, and ridges.

This map unit makes up about 40 percent of the county. It is about 50 percent Enders soils, 20 percent Steprock soils, 10 percent Nella soils, and 20 percent soils of minor extent.

The deep Enders soils are on the sides and tops of hills, mountains, and ridges. They have a surface layer of very dark grayish brown gravelly or stony fine sandy loam. The subsoil is red silty clay or clay; red, mottled clay; and mottled red and gray shaly silty clay. The underlying material is gray, partly weathered shale.

The moderately deep Steprock soils are on the sides of hills, mountains, and ridges. They have a surface layer of dark brown gravelly loam and yellowish red very gravelly loam. The underlying material is yellowish red, partly weathered sandstone.

The deep Nella soils are on hillsides, mountainsides, foot slopes, and benches. They have a surface layer of dark grayish brown gravelly and stony fine sandy loam and a subsurface layer of yellowish brown gravelly fine sandy loam. The subsoil is yellowish red gravelly and very gravelly sandy clay loam and red very gravelly sandy clay loam.

The soils of minor extent in this map unit are the moderately deep Linker soils and the shallow Mountainburg soils on the upper part of the side slopes and on benches and ridgetops and the deep Kenn and Ceda soils on narrow flood plains.

The soils in this map unit are used mainly as woodland. In some of the less sloping areas, they are used as pasture or range. In some areas, they are also used for urban development.

These soils are generally poorly suited to unsuited to cultivated crops and are moderately suited to unsuited to pasture. The potential productivity of these soils for woodland is moderate. Slope, surface stones, and hazard of erosion are the main limitations in the use of these soils for cultivated crops, pasture, or woodland. The soils in this map unit have moderate to severe limitations for most urban uses. High shrink-swell potential and slope are the main limitations of Enders soils for urban uses, depth to bedrock and slope are the main limitations of Steprock soils, and slope is the main limitation of Nella soils.

2. Steprock-Mountainburg-Rock outcrop

Moderately deep and shallow, steep to very steep, well drained, stony and loamy soils that formed in colluvium or residuum of sandstone or interbedded sandstone, siltstone, and shale; and Rock outcrop

This map unit is throughout Van Buren County. The soils are mainly on the sides of mountains and ridges.

This map unit makes up about 15 percent of the county. It is about 40 percent Steprock soils, 20 percent Mountainburg soils, 15 percent Rock outcrop, and 25 percent soils of minor extent.

The moderately deep Steprock soils are on the sides of mountains and ridges. They have a surface layer of dark brown stony fine sandy loam. The subsoil is strong brown gravelly loam and yellowish red very gravelly loam. The underlying material is yellowish red, weathered sandstone.

The shallow Mountainburg soils are on the sides of mountains and ridges. They have a surface layer of very dark grayish brown stony fine sandy loam. The subsurface layer is yellowish brown stony fine sandy loam. The subsoil is typically strong brown very gravelly sandy clay loam. The underlying material is hard, massive, sandstone bedrock.

Rock outcrop is mostly on ledges. It is also intermingled with the soils on the landscape.

The soils of minor extent in this map unit are the deep Enders and Nella soils on the sides of mountains ridges and the deep Ceda and Kenn soils on flood plains.

The soils in this map unit are used mainly as woodland. In a few areas, they are used for urban development.

These soils are generally unsuited to cultivated crops and are severely limited for pasture. The potential productivity of these soils for woodland is moderate to low. Slope, surface stones, hazard of erosion, and Rock outcrop are the main limitations to the use of these soils for cultivated crops, pasture and woodland. These soils are severely limited for most urban uses. Slope, surface stones, Rock outcrop, and depth to bedrock are the main limitations.

3. Linker-Steprock

Moderately deep, well drained, gently sloping to moderately steep, loamy and gravelly soils that formed in residuum of sandstone or interbedded sandstone, siltstone, and shale

This map unit is throughout Van Buren County. The soils are on the sides and tops of hills and ridges.

This map unit makes up about 25 percent of the county. It is about 30 percent Linker soils, 30 percent Steprock soils, and 40 percent soils of minor extent.

Linker soils are on hillsides, ridgetops, and benches. They have a surface layer of dark brown gravelly fine sandy loam. The subsoil is strong brown loam, yellowish red loam, and yellowish red sandy clay loam. The

underlying material is hard, level-bedded, acid sandstone.

Steprock soils are on the sides of hills and ridges. They have a surface layer of dark brown gravelly fine sandy loam. The subsoil is strong brown gravelly loam and yellowish red very gravelly loam. The underlying material is yellowish red, weathered sandstone.

The soils of minor extent in this map unit are the deep Enders soils, the shallow Mountainburg soils, and the deep Nauvoo soils on the sides and tops of hills and ridges, and the deep Sidon soils on plateaus and benches.

The soils in this map unit are used mainly as pasture and woodland. In some areas, they are in urban use.

These soils are moderately suited to unsuited to cultivated crops. Slope, hazard of erosion, and gravel in the surface layer are the main limitations. The soils in this map unit are well suited to poorly suited to pasture depending on slope. The potential productivity of these soils for woodland is moderate. They are moderately suited to poorly suited to most urban uses. Depth to bedrock and slope are the main limitations.

4. Steprock-Mountainburg

Moderately deep and shallow, well drained, gently sloping to moderately steep, stony and gravelly, loamy soils that formed in colluvium or residuum of sandstone or interbedded sandstone, siltstone, and shale

This map unit is throughout Van Buren County. The soils are mainly on the sides and tops of hills, mountains, and ridges.

This map unit makes up about 16 percent of the county. It is about 40 percent Steprock soils, 30 percent Mountainburg soils, and 30 percent soils of minor extent.

The moderately deep Steprock soils are on the sides of hills, mountains, and ridges. They have a surface layer of dark brown gravelly or stony fine sandy loam. The subsoil is strong brown gravelly loam and yellowish red very gravelly loam. The underlying material is yellowish red, weathered sandstone.

The shallow Mountainburg soils are on the sides and tops of hills, mountains, and ridges. They have a surface layer of very dark grayish brown gravelly or stony fine sandy loam. The subsurface layer is yellowish brown gravelly or stony fine sandy loam. The subsoil is typically strong brown very gravelly sandy clay loam. The underlying material is hard, massive, sandstone bedrock.

The soils of minor extent in this map unit are the deep Enders soils, the moderately deep Linker soils, and the deep Nella soils on the sides of hills, mountains, and ridges and the deep Ceda and Kenn soils on flood plains. Also included are areas of rock outcrop.

The soils in this map unit are used mainly as pasture and woodland. In a few areas, they are used for urban development.

These soils are poorly suited to unsuited to cultivated crops and are moderately suited to poorly suited to pasture. The potential productivity of these soils for woodland is moderate. Slope, surface stones, hazard of erosion, and rock outcrop are the main limitations in the use of these soils for cultivated crops, pasture, or woodland. These soils are moderately suited to poorly suited to most urban uses. Slope, surface stones, rock outcrop and depth to bedrock are the main limitations.

5. Kenn-Ceda-Spadra

Deep, well drained, level to nearly level, loamy and gravelly soils that formed in alluvium

This map unit is throughout Van Buren County. Kenn and Ceda soils typically are on narrow flood plains, and Spadra soils are on terraces on slightly higher elevations.

This map unit makes up about 4 percent of the county. It is about 40 percent Kenn soils, 25 percent Ceda soils, 20 percent Spadra soils, and 15 percent soils of minor extent.

Kenn soils typically have a surface layer of brown loam. The subsoil is yellowish red gravelly and very gravelly sandy clay loam. The underlying material is strong brown very gravelly fine sandy loam.

Ceda soils typically have a surface layer of very dark grayish brown gravelly loam. The underlying material is dark brown and brown very gravelly loam.

Spadra soils typically have a surface layer of dark brown loam. The subsoil is brown loam and brown fine sandy loam. The underlying material is reddish brown fine sandy loam.

The soils of minor extent in this map unit are the moderately well drained Barling soils on adjacent flood plains, the poorly drained Guthrie soils on upland flats and in depressions, and the moderately well drained Leadvale soils and the somewhat poorly drained Taft soils on terraces.

The soils in this map unit are used mainly as pasture and woodland. In several areas, Spadra soils also are used for cultivated crops.

Kenn and Ceda soils are severely limited for cultivated crops and moderately suited to pasture. Spadra soils are well suited to cultivated crops or pasture. Frequent flooding and the low available water capacity are the main limitations for use of Kenn and Ceda soils for cultivated crops and pasture. Occasional flooding is a slight to moderate hazard for cultivated crops and pasture on the Spadra soils. The potential productivity of these soils for woodland is moderately high to high. They are poorly suited or severely limited for most urban uses because of the flood hazard.

Detailed Soil Map Units

The map units on the detailed soil maps at the back of this survey represent the soils in the survey area. The map unit descriptions in this section, along with the soil maps, can be used to determine the suitability and potential of a soil for specific uses. They also can be used to plan the management needed for those uses. More information on each map unit, or soil, is given under "Use and Management of the Soils."

Each map unit on the detailed soil maps represents an area on the landscape and consists of one or more soils for which the unit is named.

A symbol identifying the soil precedes the map unit name in the soil descriptions. Each description includes general facts about the soil and gives the principal hazards and limitations to be considered in planning for specific uses.

Soils that have profiles that are almost alike make up a *soil series*. Except for differences in texture of the surface layer or of the underlying material, all the soils of a series have major horizons that are similar in composition, thickness, and arrangement.

Soils of one series can differ in texture of the surface layer or of the underlying material. They also can differ in slope, stoniness, salinity, wetness, degree of erosion, and other characteristics that affect their use. On the basis of such differences, a soil series is divided into *soil phases*. Most of the areas shown on the detailed soil maps are phases of soil series. The name of a soil phase commonly indicates a feature that affects use or management. For example, Enders gravelly fine sandy loam, 3 to 8 percent slopes, is one of several phases in the Enders series.

Some map units are made up of two or more major soils. These map units are called soil complexes.

A *soil complex* consists of two or more soils in such an intricate pattern or in such small areas that they cannot be shown separately on the soil maps. The pattern and proportion of the soils are somewhat similar in all areas. Enders-Steprock complex, 8 to 20 percent slopes, is an example.

Most map units include small scattered areas of soils other than those for which the map unit is named. Some of these included soils have properties that differ substantially from those of the major soil or soils. Such differences could significantly affect use and management of the soils in the map unit. The included soils are identified in each map unit description. Some small areas of strongly contrasting soils are identified by a special symbol on the soil maps.

Table 4 gives the acreage and proportionate extent of each map unit. Other tables (see "Summary of Tables") give properties of the soils and the limitations, capabilities, and potentials for many uses. The Glossary defines many of the terms used in describing the soils.

Soil Descriptions

1—Barling silt loam, occasionally flooded. This deep, level, moderately well drained soil is on flood plains along small streams. Areas are generally long and narrow. Flooding is infrequent under normal weather conditions; it usually occurs for brief periods from December to April. Individual areas range from about 20 to 80 acres. Slopes are 0 to 1 percent.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 5 inches, dark brown silt loam
Subsoil:
5 to 10 inches, dark brown silt loam
10 to 16 inches, dark brown silt loam that has dark yellowish brown mottles
16 to 32 inches, dark yellowish brown silt loam that has pale brown and light brownish gray mottles
32 to 48 inches, mottled dark yellowish brown and light brownish gray silt loam
48 to 72 inches, gray silt loam that has dark yellowish brown and yellowish brown mottles

Included with this soil in mapping are small areas of Leadvale, Taft, and Spadra soils. The moderately well drained Leadvale soils are on colluvial foot slopes and old stream terraces. The somewhat poorly drained Taft soils are on stream terraces and upland flats and in depressions. The well drained Spadra soils are on level to nearly level stream terraces. Also included are soils in small, low areas that are flooded frequently for short periods.

Important soil properties:

Permeability: moderate
Available water capacity: high
Soil reaction: slightly acid to very strongly acid

Surface runoff: slow
Erosion hazard: slight
Water table: perched at a depth of 1 to 4 feet from December to April
Depth to bedrock: more than 60 inches

This soil is well suited to pasture, and this is the main use. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, and white clover. Good management practices include proper stocking, controlled grazing, and weed and brush control. There are no significant limitations for pasture use.

This soil is well suited to cultivated crops. Adapted crops include soybeans, truck crops, and small grains. Occasional flooding and wetness during the winter and early in spring are the main limitations for crop production. Surface drains generally are needed to remove excess water.

The potential productivity of this soil for commercial wood products is high. Adapted species include American sycamore, shortleaf pine, loblolly pine, sweetgum, and green ash. There are no significant limitations for woodland use and management.

This soil is poorly suited to most urban uses. Occasional flooding and wetness are severe limitations for septic tank absorption fields. Flooding is also a severe limitation for dwellings, small commercial buildings, and local roads and streets. Inclusions in this map unit that are above flood-prone areas or sites in other map units should be considered for most urban uses.

This soil is in capability subclass IIw and in woodland suitability group 2o7.

2—Cane loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on convex side slopes of small hills and on toe slopes of hills and mountains. Individual areas range from about 40 to 150 acres.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 6 inches, brown loam
Subsoil:
6 to 23 inches, yellowish red loam
23 to 33 inches, compact and brittle, yellowish red clay loam that has dark red, strong brown, and very pale brown mottles.
33 to 72 inches, compact and brittle, red clay loam that has light gray, very pale brown, and strong brown mottles

Included with this soil in mapping are a few small areas of Linker and Sidon soils. The well drained Linker soils are on hillsides, ridgetops, and benches. The moderately well drained Sidon soils are on upland plateaus and broad benches. Also included are small areas of soils that have slopes of less than 3 percent.

Important soil properties:

Permeability: moderate above the fragipan and slow in the fragipan
Available water capacity: moderate
Soil reaction: medium acid to very strongly acid throughout
Surface runoff: medium
Erosion hazard: severe
Water table: perched at a depth of 2 to 3 feet from November to March
Depth to bedrock: more than 60 inches

This soil is well suited to pasture and hayland, and this is the main use (fig. 4). Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. Good management practices include proper stocking, controlled grazing, and weed and brush control.

This soil is moderately suited to cultivated crops. Adapted crops include soybeans, truck crops, grain sorghum, and small grains. Runoff is medium, and erosion is a severe hazard. Minimum tillage, contour farming, terraces, and cover crops help reduce runoff and control erosion. Conservation methods need to be intensified as slope increases.

The potential productivity of this soil for commercial wood products is moderately high. Adapted species include loblolly pine, shortleaf pine, and sweetgum. There are no significant limitations for woodland use and management.

This soil is moderately suited to most urban uses. Wetness is a moderate limitation for dwellings and small commercial buildings. Placing tile drains by footings, shaping the site so that surface water moves away from the dwelling and runoff is diverted from the dwelling, or placing buildings in high areas of the map unit help overcome this limitation. Slope is also a moderate limitation for small commercial buildings, but landshaping or adapting the design of buildings to conform to the natural slope can help overcome this limitation. Wetness is a moderate limitation for local roads and streets. Constructing roads on raised fill material or installing a drainage system can help overcome this limitation. Wetness and slow permeability are severe limitations for septic tank absorption fields. Effects of these limitations can be minimized by placing a drainage system around, or enlarging the absorption field. Also a specially designed or alternate system could be used.

This soil is in capability subclass IIIe and in woodland suitability group 3o7.

3—Dela loamy fine sand, 0 to 2 percent slopes. This soil is deep, nearly level, and well drained. It is on natural levees along the Little Red River and its

Figure 4.—An area of pasture on Cane loam, 3 to 8 percent slopes. This soil is well suited to pasture, and this is the main use.

tributaries. Flood control in the area is provided by Greers Ferry Dam; however, flooding can occur under abnormal conditions. Individual areas range from about 10 to 100 acres or more.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 10 inches, dark brown and brown loamy fine sand
Substratum:
10 to 21 inches, strong brown fine sandy loam
21 to 31 inches, strong brown stratified loamy fine sand, fine sandy loam, and silt loam
31 to 47 inches, yellowish brown loamy fine sand
47 to 57 inches, yellowish brown fine sandy loam
57 to 72 inches, pale brown very fine sandy loam

Included with this soil in mapping are small areas of Barling, Guthrie, and Spadra soils. The moderately well drained Barling soils are on flood plains. The poorly drained Guthrie soils are on upland flats and in low depressions. The well drained Spadra soils are on level and nearly level stream terraces. Also included are soils in a few small areas that are occasionally flooded.

Important soil properties:

Permeability: moderately rapid
Available water capacity: low
Soil reaction: medium acid to very strongly acid throughout
Surface runoff: slow
Erosion hazard: slight
Water table: seasonally high within 4 to 6 feet of the surface during winter and early in spring

Depth to bedrock: more than 60 inches

This soil is well suited to pasture, and this is the main use. Adapted pasture plants include bermudagrass, bahiagrass, tall fescue, and sericea lespedeza. Droughtiness during the summer is the main limitation for this soil, but this can be overcome by deferred grazing, rotation grazing, weed and brush control, and proper stocking.

This soil is moderately suited to cultivated crops. Adapted crops include soybeans, grain sorghum, watermelons, and winter small grains. Droughtiness during the summer is the main limitation for cultivated crops on this soil. Wind erosion is also a moderate hazard if the soil surface is without vegetation or crop residue. Cover crops, minimum tillage, and proper management of crop residue can reduce wind erosion.

The potential productivity of this soil for commercial wood products is high. Adapted species include shortleaf pine, loblolly pine, sweetgum, and southern red oak. Seedling mortality is a moderate hazard on this soil because of the high content of sand in the surface layer, which reduces the available water capacity. Some reinforcement planting may be needed.

This soil is normally protected from flooding by Greers Ferry Dam, but rare flooding can occur during abnormal conditions. The rare flooding is a severe limitation for most urban uses, including dwellings and small commercial buildings. Flooding and wetness are moderate limitations for septic tank absorption fields. Effects of these limitations can be minimized by constructing a drainage system around absorption fields or installing diversions to intercept water. A specially designed system or other alternate system may also be used. Rare flooding is a moderate limitation for local roads and streets.

This soil is in capability subclass IIs and in woodland suitability group 2s8.

4—Enders gravelly fine sandy loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and well drained. It is on the sides and tops of hills and ridges. Areas of this soil are generally short and narrow and irregular in shape. Individual areas range from about 10 to 80 acres.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 2 inches, very dark grayish brown gravelly fine sandy loam
Subsoil:
2 to 7 inches, yellowish red gravelly loam
7 to 13 inches, red silty clay
13 to 30 inches, red clay that has pale brown mottles
30 to 37 inches, red clay that has gray and pale brown mottles
37 to 52 inches, mottled red and gray shaly silty clay
Substratum
52 to 68 inches, gray partly weathered shale that has red mottles

Included with this soil in mapping are small areas of Leadvale, Linker, Mountainburg, and Steprock soils. The deep Leadvale soils are on the lower part of terraces. The moderately deep Linker soils are on hillsides, ridgetops, and benches. The shallow Mountainburg soils are on ridgetops and ledges. The moderately deep Steprock soils are on hillsides and ridges.

Important soil properties:

Permeability: very slow
Available water capacity: moderate
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: medium to rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet
Shrink-swell potential: high
Depth to soft bedrock: 40 to 60 inches

This soil is moderately suited to pasture, and this is the main use. Adapted pasture plants include bermudagrass, bahiagrass, tall fescue, and white clover. Management concerns include proper stocking, controlled grazing, maintaining the fertility level, and brush and weed control.

This soil is poorly suited to cultivated crops. Contour farming, minimum tillage, terraces, and cover crops can reduce runoff and help to control erosion. Other limitations for cultivated crops are a thin surface layer and the moderate available water capacity.

The potential productivity of this soil for commercial wood products is moderate. Adapted species include loblolly pine, shortleaf pine, eastern redcedar, and southern red oak. This soil is subject to rutting during the wetter seasons; otherwise, there are no significant limitations to woodland use and management.

This soil is poorly suited to most urban uses. High shrink-swell potential is a severe limitation for dwellings and small commercial buildings. Extra reinforcement in footings and backfilling with sandy material help overcome this limitation. High shrink-swell potential and low soil strength are severe limitations for local roads and streets. A suitable subgrade or base material helps prevent damage to roads and streets. Very slow permeability is a severe limitation for septic tank absorption fields. A specially designed system or an alternate system may have to be used.

This soil is in capability subclass IVe and in woodland suitability group 4o1.

5—Enders gravelly fine sandy loam, 8 to 12 percent slopes. This soil is deep, moderately sloping,

and well drained. It is on the sides and tops of hills, mountains, and ridges. Slopes are generally convex. Areas of this soil are generally irregular in shape. Individual areas range from 40 to 120 acres.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 2 inches, very dark grayish brown gravelly fine sandy loam
Subsoil
2 to 7 inches, yellowish red gravelly loam
7 to 13 inches, red silty clay
13 to 30 inches, red clay that has pale brown mottles
30 to 37 inches, red clay that has gray and pale brown mottles
37 to 52 inches, mottled red and gray shaly silty clay
Substratum:
52 to 68 inches, gray partly weathered shale that has red mottles

Included with this soil in mapping are small areas of Linker, Nella, and Steprock soils. The moderately deep Linker soils are on hillsides, ridgetops, and benches. The deep Nella soils are on hillsides, mountainsides, foot slopes, and benches. The moderately deep Steprock soils are on hillsides and ridges. Also included in mapping are a few areas where cobbles and stones are on the surface.

Important soil properties:

Permeability: very slow
Available water capacity: moderate
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet
Shrink-swell potential: high
Depth to soft bedrock: 40 to 60 inches

This soil is moderately suited to pasture, and this is the main use. Adapted pasture plants include bermudagrass, bahiagrass, tall fescue, and white clover. Management concerns include proper stocking, controlled grazing, maintaining the fertility level, and brush and weed control.

This soil is unsuited to cultivated crops. Runoff is rapid, and the erosion hazard is very severe. The slope and the gravelly surface layer restrict the use of some farm equipment.

The potential productivity of this soil for commercial wood products is moderate. Adapted species include loblolly pine, short leaf pine, southern red oak, white oak, and eastern redcedar. This soil is subject to rutting during the wetter seasons; otherwise, there are no significant limitations to woodland use and management.

This soil is poorly suited to most urban uses. High shrink-swell potential is a severe limitation for dwellings and small commercial buildings. Extra reinforcement in footings and backfilling with sandy material help overcome this limitation. Slope is also a severe limitation for small commercial buildings. Adapting the design of buildings to conform to the natural slope or landshaping can help overcome this limitation. High shrink-swell potential and low strength are severe limitations for local roads and streets. Providing suitable subgrade or base material helps to prevent damage to roads and streets. Very slow permeability is a severe limitation for septic tank absorption fields. A specially designed system or an alternate system may have to be used.

This soil is in capability subclass VIe and in woodland suitability group 4o1.

6—Enders stony fine sandy loam, 8 to 12 percent slopes. This soil is deep, moderately sloping, and well drained. It is on the sides and tops of hills, mountains, and ridges. Individual areas range from 40 to 200 acres and are generally irregular in shape.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 2 inches, very dark grayish brown stony fine sandy loam
Subsoil:
2 to 7 inches, yellowish red gravelly loam
7 to 13 inches, red silty clay
13 to 30 inches, red clay that has pale brown mottles
30 to 37 inches, red clay that has gray and pale brown mottles
37 to 52 inches, mottled red and gray shaly silty clay
Substratum:
52 to 68 inches, gray partly weathered shale that has red mottles

Included with this soil in mapping are small areas of Linker, Mountainburg, Nella, and Steprock soils. The moderately deep Linker soils are on hillsides, ridgetops, and benches. The shallow Mountainburg soils are on ridgetops and ledges. The deep Nella soils are on hillsides, mountainsides, foot slopes, and concave parts of benches. The moderately deep Steprock soils are on hillsides and ridges.

Important soil properties:

Permeability: very slow
Available water capacity: moderate
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet

Shrink-swell potential: high
Depth to soft bedrock: 40 to 60 inches

This soil is poorly suited to pasture. Adapted species include bahiagrass, bermudagrass, tall fescue, and white clover. Surface stones are the main limitation. Where surface stones are removed to facilitate the use of farm equipment, moderate amounts of forage are produced from native grasses and improved pasture.

This soil is unsuited to cultivated crops because runoff is rapid, and the erosion hazard is very severe. The slope and surface stones restrict the use of some farm equipment.

The potential productivity of this soil for commercial wood products is moderate, and this is the main use. Adapted species include loblolly pine, shortleaf pine, southern red oak, white oak, and eastern redcedar. Surface stones are a moderate limitation to the use of equipment for woodland use and management. Rutting during the wetter seasons is also a limitation.

This soil is poorly suited to most urban uses. High shrink-swell potential is a severe limitation for dwellings and small commercial buildings. Extra reinforcement in footings and backfilling with sandy material can help overcome this limitation. Slope is also a severe limitation for small commercial buildings. Adapting the design of buildings to conform with the natural slope or landshaping can help overcome this limitation. High shrink-swell potential and low soil strength are severe limitations for local roads and streets. Providing suitable subgrade or base material helps prevent damage to roads and streets. Very slow permeability is a severe limitation for septic tank absorption fields. A specially designed system or an alternate system may have to be used.

This soil is in capability subclass VIs and in woodland suitability group 4x2.

7—Enders-Nella-Steprock complex, 8 to 20 percent slopes. This complex consists of well drained, deep and moderately deep, moderately sloping to moderately steep, stony and loamy soils. Enders soil is deep and typically is on sides of hills, mountains, and ridges. Nella soil is deep and typically is in the more colluvial positions of hillsides, mountainsides, toe slopes, and concave parts of benches. Steprock soil is moderately deep and typically is on the upper part of side slopes, on the tops of hills, mountains, and ridges, and on convex parts of benches. Typically, there are stones, cobbles, and gravel on the surface in all areas; stones are the most limiting factor.

Enders, Nella, and Steprock soils are in areas that are so small or so intricately mixed that it was not practical to map them separately. This complex is about 50 percent Enders soil, 20 percent Nella soil, 20 percent Steprock soil, and 10 percent included soils. The percentage of Nella and Steprock soils varies slightly from east to west. In the western part of the survey area, in Van Buren County, the percentage of Nella soil in this complex may increase slightly, and the percentage of Steprock soil may decrease slightly. Individual areas range from about 80 to more than 500 acres.

Typically, Enders soil is covered by a thin layer of decomposed and partly decomposed leaves, needles, and twigs. Below this layer, the typical sequence, depth, color, and texture of the layers are as follows:

Surface layer:
mineral surface to 2 inches, very dark grayish brown stony fine sandy loam
Subsoil:
2 to 7 inches, yellowish red gravelly loam
7 to 13 inches, red silty clay
13 to 30 inches, red clay that has pale brown mottles
30 to 37 inches, red clay that has gray and pale brown mottles
37 to 52 inches, mottled red and gray shaly silty cla
Substratum:
52 to 68 inches, gray partly weathered shale that has red mottles

Typically, Nella soil is covered by a thin layer of decomposed and partly decomposed leaves, needles, and twigs. Below this layer, the typical sequence, depth, color, and texture of the layers are as follows:

Surface layer:
mineral surface to 3 inches, dark grayish brown stony fine sandy loam
Subsurface:
3 to 10 inches, yellowish brown gravelly fine sandy loam
Subsoil:
10 to 42 inches, yellowish red gravelly sandy clay loam
42 to 54 inches, yellowish red very gravelly sandy clay loam
54 to 72 inches, red very gravelly sandy clay loam

Typically, Steprock soil is covered by a thin layer of partly decomposed and decomposed leaves, needles, and twigs. Below this layer, the typical sequence, depth, color, and texture of the layers are as follows:

Surface layer:
mineral surface to 2 inches, dark brown stony fine sandy loam
Subsoil:
2 to 8 inches, strong brown gravelly loam
8 to 27 inches, yellowish red very gravelly loam
Substratum:
27 to 46 inches, yellowish red, weathered, soft sandstone

Included with these soils in mapping are soils similar to Steprock soil except that they are 40 to 60 inches deep over partly weathered bedrock or 10 to 20 inches deep over partly weathered shale. Also included are small areas of Mountainburg soils on ridgetops, ledges, and benches and a few areas of rock outcrop. The included soils and rock outcrop make up about 10 percent of this map unit.

Important soil properties:

Permeability: Enders soil—very slow; Nella soil—moderate; Steprock soil—moderate
Available water capacity: Enders soil—moderate; Nella soil—moderate; Steprock soil—low
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet
Shrink-swell potential: Enders soil—high; Nella soil—low; Steprock soil—low
Depth to soft bedrock: Enders—40 to 60 inches; Nella soil—more than 60 inches; Steprock soil—20 to 40 inches

In most areas of this map unit the soils are used as woodland. In a few areas they are used for pasture, and in a few areas they are used for urban development.

These soils are unsuited to cultivated crops and are poorly suited to pasture. Where pasture is established, plants include tall fescue and native grasses. Some areas can be used for native grass pasture if brush is controlled; however, controlled grazing and fire protection are needed to maintain soil cover and prevent excessive erosion. Slope and surface stones restrict the use of farm equipment.

The potential productivity of the soils in this map unit for commercial wood products is moderate. Adapted species include shortleaf pine, loblolly pine, eastern redcedar, southern red oak, white oak, post oak, and hickory. In Enders, Nella, and Steprock soils, surface stones are a moderate limitation for woodland, mainly because they restrict the use of equipment on these soils. In addition, Enders soil is subject to rutting during wet periods. Because it is only moderately deep, Steprock soil has a restricted root zone. This, along with coarse fragments, reduces the amount of moisture available to plant roots. Seedling mortality can be reduced by keeping compaction to a minimum so that the infiltration rate remains high for critical summer rains.

The soils in this map unit are moderately suited or poorly suited to most urban uses. Enders soil has severe limitation for dwellings, small commercial buildings, and local roads and streets because of the high shrink-swell potential. Low strength is also a severe limitation for local roads and streets. These limitations are generally difficult to overcome and require special design, which adds to the cost of construction. The very slow permeability of the Enders soil is a severe limitation for septic tank absorption fields. This limitation is difficult to overcome and requires special consideration in the type and design of the system used. In Nella and Steprock soils, slope and surface stones are moderate limitations for dwellings and for local roads and streets. In Enders, Nella, and Steprock soils, slope is a severe limitation for small commercial buildings. These limitations can generally be overcome but require special design, which will add to the cost of construction. Nella soil also has moderate limitations for septic tank absorption fields because of slope, moderate permeability, and surface stones. These limitations require special consideration in the design and installation of the absorption field. Depth to bedrock is a severe limitation in using the Steprock soil for septic tank absorption fields. This limitation is difficult to overcome and requires special consideration in the type and design of the system used.

These soils are in capability subclass VIs and in woodland suitability group 4x2.

8—Enders-Nella-Steprock complex, 20 to 40 percent slopes. This complex consists of well drained, deep and moderately deep, steep, loamy and stony soils. Enders soil is deep and typically is on the sides of hills, mountains, and ridges. Nella soil is deep and typically is in the more colluvial-type positions of hillsides, mountainsides, toe slopes, and concave parts of benches. Steprock soil is moderately deep and typically is on the upper part of side slopes, on tops of hills, mountains, and ridges, and on convex parts of benches. Typically, there are stones, cobbles, and gravel on the surface in all areas; stones are the most limiting factor.

The Enders, Nella, and Steprock soils are in areas that are so small or so intricately mixed that it was not practical to map them separately. The complex is about 50 percent Enders soil, 20 percent Nella soil, 20 percent Steprock soil, and 10 percent included soils. The percentage of Nella and Steprock soils varies slightly from east to west. In the western part of the survey area, in Van Buren County, the percentage of Nella soil in this complex may increase slightly, and the percentage of Steprock soil may decrease slightly. Individual areas range from about 80 to more than 500 acres.

Typically, Enders soil is covered by a thin layer of decomposed and partly decomposed leaves, needles, and twigs. Below this layer, the typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
mineral surface to 2 inches, very dark grayish brown stony fine sandy loam
Subsoil:
2 to 7 inches, yellowish red gravelly loam
7 to 13 inches, red silty clay
13 to 30 inches, red clay that has pale brown mottles

30 to 37 inches, red clay that has gray and pale brown mottles
37 to 52 inches, mottled red and gray shaly silty clay

Substratum:
52 to 68 inches, gray partly weathered shale that has red mottles

Typically, Nella soil is covered by a thin layer of decomposed and partly decomposed leaves, needles, and twigs. Under this layer, the typical sequence, depth, and color, and texture of the layers are as follows:

Surface layer:
mineral surface to 3 inches, dark grayish brown stony fine sandy loam

Subsurface:
3 to 10 inches, yellowish brown gravelly fine sandy loam

Subsoil:
10 to 42 inches, yellowish red gravelly sandy clay loam
42 to 54 inches, yellowish red very gravelly sandy clay loam
54 to 72 inches, red very gravelly sandy clay loam

Typically, Steprock soil is covered by a thin layer of decomposed and partly decomposed leaves, needles, and twigs. Below this layer, the typical sequence, depth, and color, and texture of the layers are as follows:

Surface layer:
mineral surface to 2 inches, dark brown stony fine sandy loam

Subsoil:
2 to 8 inches, strong brown gravelly loam
8 to 27 inches, yellowish red very gravelly loam

Substratum:
27 to 46 inches, yellowish red, soft weathered sandstone

Included with these soils in mapping are soils similar to Steprock soil except that they are 40 to 60 inches deep over partly weathered bedrock and soils on north aspects similar to Nella soil except that they are browner. Also included are small areas of Mountainburg soils and rock outcrop. The included soils and rock outcrop make up about 10 percent of this map unit.

Important soil properties:

Permeability: Enders soil—very slow; Nella soil—moderate; Steprock soil—moderate
Available water capacity: Enders soil—moderate; Nella soil—moderate; Steprock soil—low
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet
Shrink-swell potential: Enders soil—high; Nella soil—low; Steprock soil—low
Depth to soft bedrock: Enders soil—40 to 60 inches; Nella soil—more than 60 inches; Steprock soil—20 to 40 inches

In most areas of this map unit, the soils are used as woodland. In a few areas they are used for native pasture and urban development.

The soils are unsuited to cultivated crops and severely limited for pasture. Where pasture is established, plants include tall fescue and native grasses. Some areas can be used for native grass pasture if brush is controlled; however, controlled grazing and fire protection are needed to maintain soil cover and prevent excessive erosion. Slope and surface stones severely restrict the use of farm equipment.

The potential productivity of the soils in this map unit for commercial wood products is moderate. Adapted species include shortleaf pine, loblolly pine, eastern redcedar, southern red oak, post oak, and hickory. These soils have moderate limitations for use of equipment because steep slopes and surface stones restrict the use of rubber-tired skidders. Erosion is a hazard because of the steep slopes. Other concerns in management are restricted rooting depth of Steprock soil and the rutting of Enders soil during wet periods. Seedling mortality can be reduced by keeping compaction to a minimum so that the infiltration rate remains high for critical summer rains.

These soils are poorly suited to most urban uses. The steep slope is a severe limitation for dwellings, small commercial buildings, local roads and streets, and septic tank absorption fields. Enders soil has severe limitations for dwellings, small commercial buildings, and local roads and streets because of high shrink-swell potential and severe limitations for septic tank absorption fields because of very slow permeability. Enders soil also has a severe limitation for local roads and streets because of low strength. Steprock soil has severe limitations for septic tank absorption fields because of depth to bedrock. These limitations are difficult to overcome and require special consideration in design and construction or installation. Some areas in this map unit may be impractical for urban uses.

These soils are in capability subclass VIIs and in woodland suitability group 4x2.

9—Enders-Steprock complex, 8 to 20 percent slopes. This complex consists of well drained, deep and moderately deep, moderately sloping to moderately steep, stony and loamy soils. Enders soil is deep and typically is on sides of hills, mountains, and ridges. Steprock soil is moderately deep and typically is on the upper part of side slopes, on tops of hills, mountains, and ridges, and on convex parts of benches. Typically, there are stones, cobbles, and gravel on the surface of

the soils in this map unit; stones are the most limiting factor.

Enders and Steprock soils are in areas that are so small or so intricately mixed that it was not practical to map them separately. This complex is about 50 percent Enders soil, 30 percent Steprock soil, and 20 percent included soils. Individual areas range from about 80 to 800 acres.

Typically, Enders soil is covered by a thin layer of decomposed and partly decomposed leaves, needles, and twigs. Below this layer, the typical sequence, depth, color, and texture of the layers are as follows:

Surface layer:
mineral surface to 2 inches, very dark grayish brown stony fine sandy loam
Subsoil:
2 to 7 inches, yellowish red gravelly loam
7 to 13 inches, red silty clay
13 to 30 inches, red clay that has pale brown mottles
30 to 37 inches, red clay that has gray and pale brown mottles
37 to 52 inches, mottled red and gray shaly silty clay
Substratum:
52 to 68 inches, gray partly weathered shale that has red mottles

Typically, Steprock soil is covered by a thin layer of partially decomposed and decomposed leaves, needles, and twigs. Under this layer, the typical sequence, depth, color, and texture of the layers are as follows:

Surface layer:
mineral surface to 2 inches, dark brown stony fine sandy loam
Subsoil:
2 to 8 inches, strong brown gravelly loam
8 to 27 inches, yellowish red very gravelly loam
Substratum:
27 to 46 inches, yellowish red weathered sandstone (soft)

Included with these soils in mapping are small areas of Linker, Nella, and Mountainburg soils and rock outcrop. The moderately deep Linker soils are on hillsides, ridgetops, and benches. The deep Nella soils are on hillsides, mountainsides, foot slopes, and benches. The shallow Mountainburg soils are on ridgetops and ledges. Rock outcrop is on ledges. These included soils make up about 20 percent of this map unit.

Important soil properties:

Permeability: Enders soil—very slow; Steprock soil—moderate
Available water capacity: Enders soil—moderate; Steprock soil—low
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet
Shrink-swell potential: Enders soil—high; Steprock soil—low
Depth to soft bedrock: Enders soil—40 to 60 inches; Steprock soil—20 to 40 inches.

In most areas of this map unit, the soils are used as woodland. In a few areas they are used as pasture and for urban development.

The soils in this map unit are poorly suited to pasture and are unsuited to cultivated crops. Where pasture is established, plants include tall fescue and native grasses. In some areas, the soils can be used for native grass pasture if brush is controlled; however, controlled grazing and fire protection are needed to maintain soil cover and prevent excessive erosion. Slope and surface stones restrict the use of farm equipment.

The potential productivity of these soils for commercial wood products is moderate. Adapted species include shortleaf pine, loblolly pine, eastern redcedar, and southern red oak. The Enders and Steprock soils have moderate management limitations for woodland. These soils have surface stones, which interfere with the use of equipment. Enders soil is subject to rutting during wet periods. Steprock soil is moderately deep to bedrock, which restricts rooting depth and, along with a high content of gravel in the subsoil, reduces the amount of moisture available to the root system. Seedling mortality can be reduced by keeping compaction to a minimum so that the infiltration rate remains high for critical summer rains.

These soils are poorly suited or moderately suited to most urban uses. Enders soil has a severe limitation for dwellings, small commercial buildings, and local roads and streets because of the high shrink-swell potential. Enders soil also has a severe limitation for small commercial buildings because of the slope, and a severe limitation for septic tank absorption fields because of the very slow permeability. These limitations generally are difficult to overcome and require special consideration in the design and construction or installation, which can add to the cost. Steprock soil has moderate limitations for dwellings and local roads and streets because of slope and surface stones and a severe limitation for small commercial buildings because of slope. These limitations generally can be overcome but require special design, which will add to the cost of construction. Steprock soil has a severe limitation for septic tank absorption fields because of depth to rock. This limitation is difficult to overcome and requires special consideration in design and installation.

These soils are in capability subclass VIs and in woodland suitability group 4x2.

10—Enders-Steprock complex, 20 to 40 percent slopes. This complex consists of well drained, deep and moderately deep, steep, stony and loamy soils. Enders soil is deep and typically is on the sides of hills, mountains, and ridges. Steprock soil is moderately deep and typically is on the upper part of side slopes, on tops of hills, mountains, and ridges, and on convex parts of benches. Typically, there are stones, cobbles, and gravel on the surface of the soils in this complex; stones are the most limiting factor.

The Enders and Steprock soils are in areas that are so small or so intricately mixed that it was not practical to map them separately. This complex is about 45 percent Enders soil, 35 percent Steprock soil, and 20 percent included soils. Individual areas range from about 80 to 800 acres or more.

Typically, Enders soil is covered by a thin layer of decomposed and partly decomposed leaves, needles, and twigs. Under this layer, the typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
mineral surface to 2 inches, very dark grayish brown stony fine sandy loam
Subsoil:
2 to 7 inches, yellowish red gravelly loam
7 to 13 inches, red silty clay
13 to 30 inches, red clay that has pale brown mottles
30 to 37 inches, red clay that has gray and pale brown mottles
37 to 52 inches, mottled red and gray shaly silty clay
Substratum:
52 to 68 inches, gray partly weathered shale that has red mottles

Typically, Steprock soil is covered by a thin layer of partially decomposed and decomposed leaves, needles, and twigs. Under this layer, the typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface:
mineral surface to 2 inches, dark brown stony fine sandy loam
Subsoil:
2 to 8 inches, strong brown gravelly loam
8 to 27 inches, yellowish red very gravelly loam
Substratum:
27 to 46 inches, yellowish red weathered sandstone (soft)

Included with these soils in mapping are small areas of Mountainburg and Nella soils and rock outcrop. The shallow Mountainburg soils are on ridgetops and ledges. The deep Nella soils are on hillsides, mountainsides, foot slopes, and benches. Rock outcrop is on ledges. Also included are small areas of soils similar to Steprock soil except they are 40 to 60 inches deep to soft bedrock. The included areas make up about 20 percent of this map unit.

Important soil properties:

Permeability: Enders soil—very slow; Steprock soil—moderate
Available water capacity: Enders soil—moderate; Steprock soil—low
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet
Shrink-swell potential: Enders soil—high; Steprock soil—low
Depth to soft bedrock: Enders soil 40 to 60 inches; Steprock soil—20 to 40 inches

In most areas of this map unit, the soils are used as woodland. In a few areas they are used for native pasture and urban development.

The soils are severely limited for pasture and are unsuited to cultivated crops. Where pasture is established, plants include tall fescue and native grasses. Some areas can be used for native grass pasture if brush is controlled; however, controlled grazing and fire protection are needed to maintain soil cover and prevent excessive erosion. Slope and surface stones severely restrict the use of farm equipment.

The potential productivity of the soils in this map unit for commercial wood products is moderate. Adapted species include shortleaf pine, loblolly pine, eastern redcedar, southern red oak, white oak, post oak, and hickory. In Enders and Steprock soils surface stones and steep slopes are moderate limitations because they restrict the use of equipment. Erosion is a moderate hazard of these soils. Enders soil is subject to rutting during wet periods. Steprock soil is moderately deep to bedrock, which restricts rooting depth and, along with a high content of gravel in the subsoil, reduces the amount of moisture available to the plant roots. Seedling mortality can be reduced by keeping compaction to a minimum so that the infiltration rate remains high for critical summer rains.

These soils are poorly suited to most urban uses. Slope and high shrink-swell potential are severe limitations for the use of Enders soil for dwellings, small commercial buildings, and local roads and streets. Low strength is a severe limitation for the use of Enders soil for local roads and streets, and slope and very slow permeability are severe limitations for septic tank absorption fields. Slope is a severe limitation for the use of Steprock soil for dwellings, small commercial buildings, and local roads and streets. Depth to bedrock

and slope are severe limitations for the use of Steprock soil for septic tank absorption fields. These limitations are difficult to overcome and require special consideration in design and construction or installation. Urban use of some areas in this map unit may be impractical.

These soils are in capability subclass VIIs and in woodland suitability group 4x2.

11—Guthrie silt loam, occasionally flooded. This soil is deep, level, and poorly drained. It is on upland flats and in depressions. Flooding is infrequent during normal weather conditions; it usually occurs for brief periods from January to April. Individual areas range from 5 to 80 acres. Slopes are 0 to 1 percent.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 5 inches, dark grayish brown silt loam
Subsurface layer:
5 to 14 inches, grayish brown silt loam that has yellowish brown mottles
Subsoil:
14 to 21 inches, light brownish gray silt loam that has yellowish brown mottles
21 to 27 inches, gray silt loam that has strong brown mottles
27 to 50 inches, compact and brittle, gray silty clay loam that has yellowish brown mottles
50 to 72 inches, compact and brittle, gray silty clay loam that has yellowish brown and strong brown mottles

Included with this soil in mapping are small areas of Barling, Leadvale, and Taft soils. The moderately well drained Barling soils are on flood plains. The moderately well drained Leadvale soils are on colluvial foot slopes and old stream terraces. The somewhat poorly drained Taft soils are in similar positions on the landscape at slightly higher elevations.

Important soil properties:

Permeability: slow
Available water capacity: moderate
Soil reaction: very strongly acid or extremely acid throughout except for the surface layer in areas that have been limed
Surface runoff: very slow
Erosion hazard: slight
Water table: perched within 6 to 12 inches of the surface during the winter and early in spring
Depth to bedrock: more than 60 inches

This soil is moderately suited to pasture. Adapted pasture plants include common bermudagrass, bahiagrass, white clover, sericea lespedeza, and tall fescue. Surface drainage generally is needed to overcome the main limitation of seasonal wetness. Management concerns include proper stocking, controlled grazing, and weed and brush control.

This soil is moderately suited to warm season cultivated crops that require a short growing season. Adapted crops include soybeans and grain sorghum (fig. 5). Seasonal wetness and occasional flooding are the main limitations for crop production. Surface drainage will be needed to remove excess water.

The potential productivity of this soil for woodland is high, and woodland is the main use. Adapted species include willow oak and sweetgum. Guthrie soils have severe management limitations for the use of equipment and for seedling mortality because of wetness. The limitation on the use of equipment can be minimized by timing operations to avoid seasonal wetness. Special site preparation, such as bedding or surface drainage, may be needed to reduce seedling mortality.

This soil is poorly suited to most urban uses. Wetness and flooding are severe limitations for dwellings, small commercial buildings, and local roads and streets. Low strength is also a severe limitation for local roads and streets. Slow permeability, flooding, and wetness are severe limitations for septic tank absorption fields. Areas of included soils in this map unit that are better suited or sites in other map units should be considered for most urban uses.

This soil is in capability subclass IVw and in woodland suitability group 2w9.

12—Kenn-Ceda complex, frequently flooded. This complex consists of well drained, deep, level and nearly level soils on flood plains. Kenn soil is generally slightly higher on the flood plain than the Ceda soil.

The Kenn and Ceda soils are in areas that are so small or so intricately mixed that it was not practical to map them separately. This complex is about 50 percent Kenn soil, 30 percent Ceda soil, and 20 percent included soils. Individual areas range from about 20 to 400 acres or more. Slopes range from 0 to 2 percent.

The typical sequence, depth, color, and texture of the layers of the Kenn soil are as follows:

Surface layer:
surface to 7 inches, brown loam
Subsoil:
7 to 31 inches, yellowish red gravelly sandy clay loam
31 to 50 inches, yellowish red very gravelly sandy clay loam
50 to 72 inches, strong brown very gravelly fine sandy loam

The typical sequence, depth, color, and texture of the layers of the Ceda soil are as follows:

Surface:

Figure 5.—Grain sorghum in an area of Guthrie silt loam, occasionally flooded. This soil is moderately suited to cultivated crops that require a short growing season.

surface to 5 inches, very dark grayish brown gravelly loam

Subsoil:

5 to 15 inches, dark brown very gravelly loam
15 to 72 inches, brown very gravelly loam

Included with this complex in mapping are small areas of Barling and Spadra soils. The moderately well drained Barling soils are on flood plains. The well drained Spadra soils are on stream terraces.

Important soil properties:

Permeability: Kenn soil—moderate; Ceda soil—rapid
Available water capacity: low

Soil reaction: Kenn soil—strongly acid or very strongly acid throughout; Ceda soil—slightly acid or medium acid throughout
Surface runoff: slow to medium
Erosion hazard: slight
Depth to water table: more than 6 feet
Depth to bedrock: more than 60 inches

The soils in this map unit are moderately suited to poorly suited to pasture. Adapted pasture plants include bermudagrass, tall fescue, and white clover. The main limitations are surface gravel, droughtiness, and flooding. Good management practices include proper stocking, controlled grazing, and weed and brush control.

The soils in this map unit are unsuited to cultivated crops. The main limitations are frequent flooding and droughtiness.

The potential productivity of these soils for woodland is moderately high, and woodland is the main use. Adapted species include loblolly pine, shortleaf pine, and southern red oak. Because of the low available water capacity, seedling mortality is a moderate limitation on Ceda soil. The low available water capacity is caused by a high content of course fragments in the subsoil.

These soils are severely limited for most urban uses. Frequent flooding is a severe limitation for dwellings, small commercial buildings, local roads and streets, and septic tank absorption fields. The included soils in this map unit that are above flood-prone areas or sites in other map units should be considered for most urban uses.

These soils are in capability subclass Vw. Kenn soil is in woodland suitability group 3o7. Ceda soil is in woodland suitability group 3f8.

13—Leadvale silt loam, 1 to 3 percent slopes. This soil is deep, nearly level, and moderately well drained. It is on colluvial foot slopes and old stream terraces. Individual areas range from about 20 to 200 acres.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 6 inches, brown silt loam
Subsoil:
6 to 18 inches, yellowish brown silty clay loam
18 to 23 inches, yellowish brown silty clay loam that has pale brown and strong brown mottles
23 to 39 inches, compact and brittle, yellowish brown silty clay loam that has gray and strong brown mottles
39 to 51 inches, mottled yellowish brown and gray silty clay loam
Bedrock:
51 inches, interbedded shale and sandstone

Included with this soil in mapping are small areas of Cane, Sidon, and Taft soils. The moderately well drained Cane soils are on the side slopes of small hills and on the toe slopes of hills and mountains. The moderately well drained Sidon soils are in similar positions on the landscape as the Leadville soil. The somewhat poorly drained Taft soils are on small stream terraces and upland flats and in depressions.

Important soil properties:

Permeability: moderately slow to slow
Available water capacity: moderate
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: slow to medium
Erosion hazard: moderate
Water table: perched 2 to 3 feet below the surface during winter and early in spring
Depth to bedrock: 48 inches or more

This soil is well suited to pasture and hayland, and this is the main use. Adapted pasture plants include bahiagrass, common bermudagrass, tall fescue, white clover, and sericea lespedeza. Good management practices include proper stocking, controlled grazing, and weed and brush control.

This soil is well suited to cultivated crops. Adapted crops include soybeans, truck crops, grain sorghum, and winter small grains. If there is adequate erosion control, clean tilled crops can be grown. Terraces, contour cultivation, minimum tillage, proper management of crop residue, and the use of cover crops can reduce runoff and control erosion.

The potential productivity of this soil for commercial wood products is moderately high. Adapted species includes loblolly pine, shortleaf pine, southern red oak, and white oak. There are no significant limitations to woodland use and management.

This soil is moderately suited to most urban uses. Wetness is a moderate limitation for dwellings and small commercial buildings. Constructing tile drains by footings, shaping of the site so surface water moves away from the dwelling and runoff is diverted from the dwelling, or placing the dwelling in a high area of the map unit can help overcome this limitation. Low strength is a moderate limitation for local roads and streets. Providing suitable subgrade or base material helps to prevent damage to roads and streets. Wetness is also a moderate limitation for local roads and streets. Constructing roads on raised fill material or installing a drainage system can help overcome this limitation. Wetness and slow permeability are severe limitations for septic tank absorption fields. Constructing a drainage system around, or enlarging the absorption field may minimize the affects of these limitations. A specially designed or alternate system can also be used.

This soil is in capability subclass IIe and in woodland suitability group 3o7.

14—Leadvale silt loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on colluvial foot slopes and old stream terraces. Individual areas range from about 10 to 200 acres.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 6 inches, brown silt loam
Subsoil:
6 to 18 inches, yellowish brown silty clay loam
18 to 23 inches, yellowish brown silty clay loam that has pale brown and strong brown mottles
23 to 39 inches, compact and brittle, yellowish brown silty clay loam that has gray and strong brown mottles
39 to 51 inches, mottled yellowish brown and gray silty clay loam
Bedrock:
51 inches, interbedded shale and sandstone

Included with this soil in mapping are small areas of Cane and Sidon soils. The moderately well drained Cane soil is on convex side slopes of small hills and on the toe slopes of hills and mountains. The moderately well drained Sidon soil is in similar positions on the landscape as the Leadvale soil.

Important soil properties:

Permeability: moderately slow to slow
Available water capacity: moderate
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: medium
Erosion hazard: severe
Water table: perched 2 to 3 feet below the surface during winter and early in spring
Depth to bedrock: 48 inches or more

This soil is well suited to pasture and hayland, and this is the main use (fig. 6). Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, white clover, sericea lespedeza, and annual lespedeza. Good management practices include proper stocking, controlled grazing, and weed and brush control.

This soil is moderately suited to cultivated crops. Adapted crops include soybeans, truck crops, grain sorghum, and small grain. If there is adequate erosion control, clean tilled crops can be grown. Terraces, contour cultivation, minimum tillage, proper management of crop residue, and the use of cover crops can reduce runoff and control erosion. Conservation practices need to be intensified as slope length and gradient increase.

The potential productivity of this soil for commercial wood products is moderately high. Adapted species include loblolly pine, shortleaf pine, southern red oak, and white oak. This soil has no significant limitations for woodland.

This soil is moderately suited to most urban uses. Wetness is a moderate limitation for dwellings and small commercial buildings. Constructing tile drains by footings, shaping of the site so surface water moves away from dwellings and runoff is diverted from dwellings, or placing dwellings in high areas of the map unit can help overcome this limitation. Slope is also a moderate limitation for small commercial buildings. Landshaping or adapting the design to conform to the natural slope can help overcome this limitation. Wetness is a moderate limitation for local roads and streets. Constructing roads on raised fill material or installing a drainage system can help overcome this limitation. Low strength is also a moderate limitation for local roads and streets. Providing suitable subgrade or base material helps to prevent damage to roads and streets. Wetness and slow permeability are severe limitations for septic tank absorption fields. Constructing a drainage system around, or enlarging the absorption field can minimize the affect of these limitations. A specially designed or an alternate system can also be used.

This soil is in capability subclass IIIe and in woodland suitability group 3o7.

15—Linker fine sandy loam, 3 to 8 percent slopes. This soil is moderately deep, gently sloping, and well drained. It is on hillsides, ridgetops, and benches. Individual areas range from about 20 to 100 acres.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 5 inches, dark brown fine sandy loam
Subsoil:
5 to 12 inches, strong brown loam
12 to 24 inches, yellowish red loam
24 to 32 inches, yellowish red sandy clay loam
Bedrock:
32 to 35 inches, hard, level-bedded acid sandstone

Included with this soil in mapping are small areas of Cane, Mountainburg, Nauvoo, Sidon, and Steprock soils. The moderately well drained Cane soils are on convex side slopes of small hills and on toe slopes of hills and mountains. The well drained Mountainburg soils are on ridgetops and ledges. The well drained Nauvoo soils are on hillsides and ridgetops. The moderately well drained Sidon soils are on upland plateaus and broad benches. The well drained Steprock soils are on hillsides and ridges. Also included are a few areas of soils that have a gravelly surface layer.

Important soil properties:

Permeability: moderate
Available water capacity: low
Soil reaction: strongly acid to extremely acid throughout
Surface runoff: medium

Figure 6.—Pasture and hayland are in an area of Leadvale silt loam, 3 to 8 percent slopes. This soil produces excellent forage, and this is the main use.

Erosion hazard: severe
Depth to water table: more than 6 feet
Depth to hard bedrock: 20 to 40 inches

This soil is well suited to pasture and hayland, and this is the main use. Adapted pasture plants include bermudagrass, bahiagrass, tall fescue, and white clover. There are no significant limitations for pasture. Deferred grazing, rotation grazing, brush and weed control, and proper stocking are management practices that help control erosion.

This soil is moderately suited to cultivated crops. Adapted crops include soybeans, grain sorghum, winter small grains, and truck crops (fig. 7). If there is adequate erosion control, clean tilled crops can be grown in rotation with grasses. Terraces, contour cultivation, minimum tillage, proper management of crop residue, and the use of cover crops can reduce runoff and help to control erosion. Conservation practices need to be intensified as the length and gradient of the slope increase.

The potential productivity of this soil for commercial wood products is moderate. Adapted species include shortleaf pine, loblolly pine, and eastern redcedar. There are no significant limitations for woodland use and management.

This soil is moderately suited to most urban uses. Depth to rock is a moderate limitation for dwellings and small commercial buildings. Checking for deeper areas or inclusions in the map unit, building above rock, and landscaping with additional fill or selecting a better suited soil can help overcome this limitation. Slope is also a moderate limitation for small commercial buildings. Designing buildings to conform with natural slope and shaping the land can help overcome this limitation. Depth to rock is a moderate limitation for local roads and

Figure 7.—An area of squash on Linker fine sandy loam, 3 to 8 percent slopes. This soil is suitable for truck crops adapted to the local climate.

streets. Planning grades and locations to avoid removal of rock, ripping the rock where soft enough, and blasting the rock when necessary can help overcome this limitation. Depth to rock is a severe limitation for septic tank absorption fields. This limitation is generally difficult to overcome; a specially designed system or an alternate system may have to be used.

This soil is in capability subclass IIIe and in woodland suitability group 4o1.

16—Linker gravelly fine sandy loam, 3 to 8 percent slopes. This soil is moderately deep, gently sloping, and well drained. It is on hillsides, ridgetops, and benches. Individual areas range from about 20 to 150 acres.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 5 inches, dark brown gravelly fine sandy loam
Subsoil:
5 to 12 inches, strong brown loam
12 to 24 inches, yellowish red loam
24 to 32 inches, yellowish red sandy clay loam
Bedrock:
32 to 35 inches, hard, level-bedded acid sandstone

Included with this soil in mapping are small areas of Cane, Mountainburg, Nauvoo, Sidon, and Steprock soils. The moderately well drained Cane soils are on convex slopes of small hills and on the toe slopes of hills and mountains. The well drained Mountainburg soils are on ridgetops and ledges. The well drained Nauvoo soils are on hillsides and ridgetops. The moderately well drained

Sidon soils are on upland plateaus and broad benches. The well drained Steprock soils are on hillsides and ridges.

Important soil properties:

Permeability: moderate
Available water capacity: low
Soil reaction: strongly acid to extremely acid throughout
Surface runoff: medium
Erosion hazard: severe
Depth to water table: more than 6 feet
Depth to hard bedrock: 20 to 40 inches

This soil is well suited to pasture and hayland, and this is the main use (fig. 8). Adapted pasture plants include bermudagrass, bahiagrass, tall fescue, and white clover. There are no significant limitations for pasture. Deferred grazing, rotation grazing, brush and weed control, and proper stocking are management practices that help control erosion.

This soil is moderately suited to cultivated crops. Adapted crops include soybeans, grain sorghum, winter small grains, and truck crops. If there is adequate erosion control, clean tilled crops can be grown in rotation with grasses. Terraces and contour cultivation, minimum tillage, proper management of crop residue, and the use of cover crops can reduce runoff and control erosion. Conservation practices need to be intensified as the length and gradient of the slope increase.

The potential productivity of this soil for commercial wood products is moderate. Adapted species include shortleaf pine, loblolly pine, and eastern redcedar. There are no significant limitations for woodland use and management.

This soil is moderately suited to most urban uses. Depth to rock is a moderate limitation for dwellings and small commercial buildings. Checking for deeper areas or inclusions in the map unit, building above rock, and landscaping with additional fill or selecting a better suited soil can help overcome this limitation. Slope is also a moderate limitation for small commercial buildings. Designing buildings to conform with the natural slope and shaping the land can help overcome this limitation. Depth to rock is a moderate limitation for local roads and

Figure 8.—Pasture and hayland in an area of Linker gravelly fine sandy loam, 3 to 8 percent slopes. This soil is well suited to pasture and hayland, and this is the main use.

streets. Planning grades and locations to avoid removal of rock, ripping the rock where it is soft enough, and blasting the rock when necessary can help overcome this limitation. Depth to rock is a severe limitation for septic tank absorption fields. This limitation is generally difficult to overcome and a specially designed system or an alternate system may have to be used.

This soil is in capability subclass IIIe and in woodland suitability group 4o1.

17—Linker gravelly fine sandy loam, 8 to 12 percent slopes. This soil is moderately deep, moderately sloping, and well drained. It is on hillsides, ridgetops, and benches. Individual areas range from about 20 to 150 acres.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 5 inches, dark brown gravelly fine sandy loam
Subsoil:
5 to 12 inches, strong brown loam
12 to 24 inches, yellowish red loam
24 to 32 inches, yellowish red sandy clay loam
Bedrock:
32 to 35 inches, hard, level-bedded acid sandstone

Included with this soil in mapping are small areas of Cane, Mountainburg, Nauvoo, Sidon, and Steprock soils. The moderately well drained Cane soils are on convex slopes of small hills and on the toe slopes of hills and mountains. The well drained Mountainburg soils are on ridgetops and ledges. The well drained Nauvoo soils are on hillsides and ridgetops. The moderately well drained Sidon soils are on upland plateaus and broad benches. The well drained Steprock soils are on hillsides and ridges.

Important soil properties:

Permeability: moderate
Available water capacity: low
Soil reaction: strongly acid to extremely acid throughout
Surface runoff: rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet
Depth to hard bedrock: 20 to 40 inches

This soil is well suited to pasture, and this is the main use. Adapted pasture plants include bermudagrass, bahiagrass, tall fescue, and white clover. Deferred grazing, rotation grazing, brush and weed control, and proper stocking are good management practices that help control erosion.

This soil is poorly suited to cultivated crops. If there is adequate erosion control, sown crops can be grown in rotation with grasses. Terraces, contour cultivation, minimum tillage, proper management of crop residue, and the use of cover crops can reduce runoff and control erosion. Conservation practices need to be intensified as the length and gradient of the slope increase.

The potential productivity of this soil for commercial wood products is moderate. Adapted species include shortleaf pine, loblolly pine, and eastern redcedar. There are no significant limitations for woodland use and management.

This soil is moderately suited to most urban uses. Depth to rock is a moderate limitation for dwellings and small commercial buildings. Checking for deeper areas or inclusions in the map unit, building above rock, and landscaping with additional fill or selecting a better suited soil can help overcome this limitation. Slope is also a moderate limitation for dwellings and a severe limitation for small commercial buildings. Designing buildings to conform with the natural slope and shaping the land can help overcome this limitation. Depth to rock is a moderate limitation for local roads and streets. Planning grades and locations to avoid removal of rock, ripping the rock where it is soft enough, and blasting the rock when necessary can help overcome this limitation. Slope is also a moderate limitation for local roads and streets. Landshaping and grading and adapting the design to the slope minimizes the effects of this limitation. Depth to rock is a severe limitation for septic tank absorption fields. This limitation is difficult to overcome, and a specially designed system or an alternate system may have to be used.

This soil is in capability subclass IVe and in woodland suitability group 4o1.

18—Linker-Mountainburg complex, 3 to 8 percent slopes. This complex consists of well drained, moderately deep and shallow, gently sloping soils on hillsides, ridgetops, benches, and ledges. The Linker soil is generally in a slightly lower position on the landscape than the Mountainburg soil.

Linker and Mountainburg soils are in areas that are so small or so intricately mixed that it was not practical to map them separately. This complex is about 50 percent Linker soil, 30 percent Mountainburg soil, and 20 percent included soils. Individual areas range from about 40 to 100 acres or more.

The typical sequence, depth, color, and texture of the layers of the Linker soil are as follows:

Surface layer:
surface to 5 inches, dark brown gravelly fine sandy loam
Subsoil:
5 to 12 inches, strong brown loam
12 to 24 inches, yellowish red loam
24 to 32 inches, yellowish red sandy clay loam
Bedrock:
32 to 35 inches, hard, level-bedded acid sandstone

The typical sequence, depth, and composition of the layers of the Mountainburg soil are as follows:

Surface layer:
surface to 2 inches, very dark grayish brown gravelly fine sandy loam
Subsurface layer:
2 to 7 inches, yellowish brown gravelly fine sandy loam
Subsoil:
7 to 17 inches, strong brown very gravelly sandy clay loam
Bedrock:
17 to 20 inches, hard, acid sandstone

Included with these soils in mapping are small areas of Nauvoo, Sidon, and Steprock soils. The well drained Nauvoo soils are on hillsides and ridgetops. The moderately well drained Sidon soils are on upland plateaus and broad benches. The well drained Steprock soils are on adjacent hillsides and ridges. Also included are a few small areas of rock outcrop and areas that have cobbles and stones on the surface.

Important soil properties:

Permeability: Linker soil—moderate; Mountainburg soil—moderately rapid
Available water capacity: Linker soil—low; Mountainburg soil—very low
Soil reaction: Linker soil—strongly acid to extremely acid throughout; Mountainburg soil—strongly acid or very strongly acid throughout
Runoff: medium
Erosion hazard: Linker soil—severe; Mountainburg soil—very severe
Depth to water table: more than 6 feet
Depth to hard bedrock: Linker soil—20 to 40 inches; Mountainburg soil—12 to 20 inches

The soils in this map unit are well suited to moderately suited to pasture, and this is the main use. Linker soil is well suited to pasture, and Mountainburg soil is moderately suited to pasture. Adapted pasture plants include bermudagrass, bahiagrass, tall fescue, and white clover. Linker soil has no significant limitations for pasture. Mountainburg soil has moderate limitations for pasture because of the very low available water capacity and depth to rock. Management practices that can help control erosion include deferred grazing, rotation grazing, brush and weed control, and proper stocking.

These soils are moderately suited to poorly suited to cultivated crops. Linker soil is moderately suited to cultivated crops and Mountainburg soil is poorly suited. Contour cultivation, minimum tillage, proper management of crop residue, and the use of cover crops can reduce runoff and control erosion. Conservation practices need to be intensified as the length and gradient of the slope increase.

The potential productivity of Linker soil for commercial wood products is moderate, and the potential productivity for Mountainburg soil is low. Adapted species include shortleaf pine, loblolly pine, and eastern redcedar. Linker soil has no significant limitations for woodland use or management. Mountainburg soil has moderate limitations because of depth to rock and very low available water capacity. Seedling mortality can be reduced by limiting compaction so that infiltration rates remain high for critical summer rains.

The soils in this map unit are moderately suited to poorly suited to most urban uses. Depth to rock is a moderate limitation in Linker soil and a severe limitation in Mountainburg soil for dwellings and small commercial buildings. Checking for deeper areas or inclusions in the map unit, building above the rock and landscaping with additional fill, or selecting a better site can help overcome this limitation. Slope is also a moderate limitation for small commercial buildings. Designing buildings to conform with the natural slope and shaping the land can help overcome this limitation. Depth to rock is a moderate limitation for Linker soil and a severe limitation for Mountainburg soil for local roads and streets. Planning grades and locations to avoid removal of rock, ripping the rock where soft enough, and blasting the rock when necessary can help overcome this limitation. Depth to rock is a severe limitation in both Linker and Mountainburg soils for septic tank absorption fields. This limitation is generally difficult to overcome and a specially designed system or an alternate system may have to be used.

These soils are in capability subclass IVe. Linker soil is in woodland suitability group 4o1. The Mountainburg soil is in woodland suitability group 5d2.

19—Linker-Mountainburg complex, 8 to 20 percent slopes. This complex consists of well drained, moderately deep and shallow, moderately sloping to moderately steep soils on hillsides, ridgetops, benches, and ledges. Linker soil is generally in a slightly lower position on the landscape than Mountainburg soil.

Linker and Mountainburg soils are in areas that are so small or so intricately mixed that it was not practical to map them separately. This complex is about 50 percent Linker soil, 30 percent Mountainburg soil, and 20 percent included soils. Individual areas range from about 20 to 150 acres.

The typical sequence, depth, color, and texture of the layers of Linker soil are as follows:

Surface layer:
surface to 5 inches, dark brown gravelly fine sandy loam
Subsoil:
5 to 12 inches, strong brown loam
12 to 24 inches, yellowish red loam
24 to 32 inches, yellowish red sandy clay loam

Bedrock:
32 to 35 inches, hard, level-bedded acid sandstone

The typical sequence, depth, color, and texture of the layers of the Mountainburg soil are as follows:

Surface layer:
surface to 2 inches, very dark grayish brown gravelly fine sandy loam
Subsurface layer:
2 to 7 inches, yellowish brown gravelly fine sandy loam
Subsoil:
7 to 17 inches, strong brown very gravelly sandy clay loam
Bedrock:
17 to 20 inches, hard, acid sandstone

Included with these soils in mapping are small areas of Enders, Nauvoo, Nella, Sidon, and Steprock soils. The well drained Enders soils are on hillsides, mountainsides, and ridges. The well drained Nauvoo soils are on hillsides and ridgetops. The well drained Nella soils are on hillsides, mountainsides, foot slopes, and benches. The moderately well drained Sidon soils are on upland plateaus and broad benches. The well drained Steprock soils are on adjacent hillsides and ridges. Also included are a few small areas of rock outcrop and areas that have cobbles and stones on the surface.

Important soil properties:

Permeability: Linker soil—moderate; Mountainburg soil—moderately rapid
Available water capacity: Linker soil—low; Mountainburg soil—very low
Soil reaction: Linker soil—strongly acid to extremely acid throughout; Mountainburg soil—strongly acid or very strongly acid throughout
Surface runoff: rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet
Depth to hard bedrock: Linker soil—20 to 40 inches; Mountainburg soil—12 to 20 inches

The soils in this map unit are moderately suited to poorly suited to pasture, and this is the main use. Linker soil is moderately suited to pasture and Mountainburg soil is poorly suited to pasture. Slope and the erosion hazard are the main limitations on Linker soil. Depth to bedrock, the very low available water capacity, slope, and the hazard of erosion are limitations on Mountainburg soil. Adapted pasture plants include bermudagrass, bahiagrass, and tall fescue. Deferred grazing, rotation grazing, brush and weed control, and proper stocking are good management practices that can help control erosion.

Linker soil is poorly suited to cultivated crops, and Mountainburg soil is unsuited to this use. Rapid runoff and a very severe erosion hazard are limitations to use of these soils for cultivated crops. In addition, Mountainburg soil is shallow to bedrock and has a very low available water capacity.

The potential productivity of Linker soil for commercial woodland is moderate, and potential productivity of Mountainburg soil is low. Adapted species include shortleaf pine, loblolly pine, and eastern redcedar. Linker soil has no significant limitations for woodland use or management. Mountainburg soil has moderate limitations because of depth to bedrock and very low available water capacity. Seedling mortality can be reduced by limiting compaction so infiltration rates remain high for critical summer rains.

The soils in this map unit are moderately suited to poorly suited to most urban uses. Depth to bedrock is a moderate limitation on Linker soil for dwellings and small commercial buildings, and is a severe limitation on Mountainburg soil. Checking for deeper areas or inclusions in the map unit, building above the rock and landscaping with additional fill, or selecting a better site can help overcome this limitation. Slope is a moderate limitation for dwellings and a severe limitation for small commercial buildings on both Linker and Mountainburg soils. Designing buildings to conform with the natural slope and shaping the land can help overcome this limitation. Depth to rock is a moderate limitation on Linker soil and a severe limitation on Mountainburg soil for local roads and streets. Planning grades and locations to avoid removal of rock, ripping the rock where soft enough, and blasting the rock when necessary can help overcome this limitation. Slope is also a moderate limitation for local roads and streets. Constructing roads on the contour, landshaping and grading, and adapting the design to the slope can help overcome this limitation. Depth to rock is a severe limitation on both Linker and Mountainburg soils for septic tank absorption fields. This limitation is generally difficult to overcome, and a specially designed system or an alternate system may have to be used.

These soils are in capability subclass VIe. Linker soil is in woodland suitability group 4o1. Mountainburg soil is in woodland suitability group 5d2.

20—Mountainburg-Rock outcrop complex, 1 to 12 percent slopes. This complex consists of well drained, shallow, nearly level to moderately sloping soils and Rock outcrop on ridgetops and ledges. Slopes are smooth. This complex typically has stones, cobbles, and gravel on the surface; stones are the most limiting factor.

Areas of Mountainburg soil and Rock outcrop are so small or so intricately mixed that it was not practical to map them separately. This map unit is about 50 percent Mountainburg soil, 30 percent Rock outcrop, and 20 percent included soils. Individual areas are long and narrow and range from about 10 to 200 acres.

The typical sequence, depth, color, and texture of the layers of Mountainburg soil are as follows:

Surface layer:
surface to 2 inches, very dark grayish brown stony fine sandy loam
Subsurface layer:
2 to 7 inches, yellowish brown stony fine sandy loam
Subsoil:
7 to 17 inches, strong brown very gravelly sandy clay loam
Bedrock:
17 to 20 inches, hard, acid sandstone

Typically, Rock outcrop consists of barren sandstone bedrock, but it also includes areas that have a few inches of sandy soil material and fragments weathered from sandstone.

Included with this complex in mapping are small areas of Linker and Steprock soils. These well drained soils are on hillsides, ridgetops, and ledges.

Important properties of Mountainburg soil:

Permeability: moderately rapid
Available water capacity: very low
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet
Depth to hard bedrock: 12 to 20 inches

This map unit is unsuited to pasture or to cultivated crops. Limitations include surface stones, Rock outcrop, very low available water capacity, rapid runoff, and a very severe hazard of erosion. These limitations are very difficult or impractical to overcome.

The potential productivity of the soils in this map unit for commercial wood products is low. These soils are used mostly for scrub woods and wildlife. Because of very severe hazard of erosion and subsequent productivity loss, the soil is best maintained in woodland. The main limitations, which result from a shallow depth to bedrock and a stony surface layer, are windthrow hazard and seedling mortality. Rock outcrop and surface stones also restrict the use of equipment for woodland management.

This map unit is poorly suited to most urban uses. Depth to rock and large stones are severe limitations for dwellings, small commercial buildings, local roads and streets, and septic tank absorption fields. These limitations are difficult or impractical to overcome.

The Mountainburg soil in this complex is in capability subclass VIs and in woodland suitability group 5x3. Rock outcrop is in capability subclass VIIIs.

21—Nauvoo fine sandy loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and well drained. It is on hillsides and ridgetops. Individual areas range from about 20 to 200 acres.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 6 inches, dark brown fine sandy loam
Subsoil:
6 to 12 inches, strong brown fine sandy loam
12 to 33 inches, yellowish red sandy clay loam
33 to 43 inches, yellowish red fine sandy loam
Substratum:
43 to 60 inches, yellowish red and gray, weathered, level-bedded sandstone

Included with this soil in mapping are small areas of Linker, Sidon, and Steprock soils. Linker soils are on hillsides, ridgetops, and benches. Sidon soils are on upland plateaus and broad benches. Steprock soils are on hillsides and ridges. Also included are a few small areas that have a gravelly surface layer and areas where slopes are more than 8 percent.

Important soil properties:

Permeability: moderate
Available water capacity: moderate
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: medium to rapid
Erosion hazard: severe
Depth to water table: more than 6 feet
Depth to soft bedrock: 40 to 60 inches

This soil is well suited to pasture and hayland, and this is the main use. Adapted pasture plants include bermudagrass, bahiagrass, tall fescue, and white clover. There are no significant limitations for pasture. Deferred grazing, rotation grazing, brush and weed control, and proper stocking are good management practices that can help control erosion.

This soil is moderately suited to cultivated crops. Adapted crops include soybeans, grain sorghum, and winter small grains. Strawberries and other fruit and truck crops adapted to the local climate are also grown on this soil. Under good management, which includes adequate erosion control, clean-tilled crops can be safely grown in the less sloping areas. Terraces, contour cultivation, minimum tillage, proper management of crop residue, and the use of cover crops in the cropping system can reduce runoff and help to control erosion.

The potential productivity of this soil for commercial wood products is high. Adapted species include loblolly pine, shortleaf pine, sweetgum, and southern red oak. There are no significant limitations for woodland use and management.

This soil is moderately suited to most urban uses. There are no significant limitations for dwellings. Slope is

a moderate limitation for small commercial buildings. Designing buildings to conform to the natural slope and shaping the land can help overcome this limitation. Low strength is a moderate limitation for local roads and streets. Providing suitable subgrade and base material helps to prevent damage to roads and streets. Depth to rock and moderate permeability are moderate limitations for septic tank absorption fields. Enlarging the absorption field helps to minimize the effects of moderate permeability. Depth to rock is more difficult to overcome. A specially designed system or an alternate system may have to be used.

This Nauvoo soil is in capability subclass IIIe and in woodland suitability group 2o7.

22—Nella-Steprock complex, 8 to 20 percent slopes. This complex consists of well drained, deep and moderately deep, moderately sloping to moderately steep, loamy and gravelly soils. Nella soil is deep and typically is in the more colluvial positions of hillsides, mountainsides, toe slopes, and concave parts of benches. Steprock soil is moderately deep and typically is on the upper part of side slopes, tops of hills, mountains, ridges, and convex parts of benches.

The Nella and Steprock soils are in areas that are so small or so intricately mixed that it was not practical to map them separately. This complex is about 50 percent Nella soil, 25 percent Steprock soil, and 25 percent included soils. Individual areas range from about 20 to 200 acres or more.

The typical sequence, depth, color, and texture of the layers of the Nella soil are as follows:

Surface layer:
surface to 3 inches, dark grayish brown gravelly fine sandy loam
Subsurface layer:
3 to 10 inches, yellowish brown gravelly fine sandy loam
Subsoil:
10 to 42 inches, yellowish red gravelly sandy clay loam
42 to 54 inches, yellowish red very gravelly sandy clay loam
54 to 72 inches, red very gravelly sandy clay loam

The typical sequence, depth, color, and texture of the layers of the Steprock soil are as follows:

Surface layer:
surface to 2 inches, dark brown gravelly fine sandy loam
Subsoil:
2 to 8 inches, strong brown gravelly loam
8 to 27 inches, yellowish red very gravelly loam
Substratum:
27 to 46 inches, yellowish red, weathered soft sandstone

Included with these soils in mapping are small areas of Enders and Mountainburg soils. The well drained Enders soils are on hillsides, mountainsides, and ridges. The well drained Mountainburg soils are on ridgetops and ledges. Also included are soils similar to Steprock soil except they are more than 40 inches deep to bedrock. Also included are small areas of similar soils that have cobbles and stones on the surface.

Important soil properties:

Permeability: moderate
Available water capacity: Nella soil—moderate; Steprock soil—low
Soil reaction: strongly acid to very strongly acid throughout
Surface runoff: rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet
Depth to bedrock: Nella soil—more than 60 inches; Steprock soil—20 to 40 inches (soft)

In most areas of this map unit the soils are used as woodland. In few areas they are used as pasture, and in a few areas they are used for urban development.

The soils in this map unit are moderately suited to pasture. Where pasture is established, adapted species include bermudagrass, tall fescue, and white clover. In many uncleared areas, there is an understory of native grasses. Proper stocking, timely deferment of grazing, fire prevention, and brush control help to keep the native pasture and soil in good condition and to control erosion.

The soils in this map unit are generally unsuited to cultivated crops. Moderately steep slopes limit the use of farm equipment.

The potential productivity of Nella soil for commercial wood products is moderately high. The potential productivity of Steprock soil for commercial wood products is moderate because depth to bedrock restricts rooting depth and the high content of gravel in the subsoil reduces the amount of water available to the plant roots. The soils in this map unit have no significant limitations for woodland management and use. Adapted species include shortleaf pine, eastern redcedar, and loblolly pine. Seedling mortality can be reduced by limiting compaction so infiltration rates can remain high for critical summer rains.

The soils in this map unit are moderately suited to poorly suited to most urban uses. Slope is a moderate limitation for dwellings and local roads and streets and a severe limitation for small commercial buildings. Nella soil has moderate limitations for septic tank absorption fields because of slope and moderate permeability. These limitations generally can be overcome but will require special consideration in design and construction or installation, which will add to the cost. Steprock soil has a severe limitation for septic tank absorption fields

because of depth to rock. This limitation is difficult to overcome and requires special consideration in the design and type of system used.

The soils in this map unit are in capability subclass VIe. Nella soil is in woodland suitability group 3o1, and Steprock soil is in woodland suitability group 4o1.

23—Nella-Steprock complex, 20 to 40 percent slopes. This complex consists of well drained, deep and moderately deep, steep, loamy and stony soils. Nella soil is deep and typically is in the more colluvial positions on hillsides, mountainsides, toe slopes, and concave parts of benches. Steprock soil is moderately deep and typically is on the upper part of side slopes; on tops of hills, mountains, and ridges; and on convex part of benches. Typically, there are stones, cobbles, and gravel on the surface in all areas; stones are the most limiting factor.

The Nella and Steprock soils are in areas that are so small or so intricately mixed that it was not practical to map them separately. This complex is about 50 percent Nella soil, 25 percent Steprock soil, and 25 percent included soils. Individual areas range from about 20 to 200 acres or more.

Typically, Nella soil is covered by a thin layer of decomposed and partly decomposed leaves, needles, and twigs. Under this layer, the typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
mineral surface to 3 inches, dark grayish brown stony fine sandy loam
Subsurface layer:
3 to 10 inches, yellowish brown gravelly fine sandy loam
Subsoil:
10 to 42 inches, yellowish red gravelly sandy clay loam
42 to 54 inches, yellowish red very gravelly sandy clay loam
54 to 72 inches, red very gravelly sandy clay loam

Typically, Steprock soil is covered by a thin layer of decomposed and partly decomposed leaves, needles, and twigs. Under this layer, the typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
mineral surface to 2 inches, dark brown stony fine sandy loam
Subsoil:
2 to 8 inches, strong brown gravelly loam
8 to 27 inches, yellowish red very gravelly loam
Substratum:
27 to 46 inches, yellowish red, weathered, soft sandstone

Included with these soils in mapping are small areas of Enders and Mountainburg soils. The well drained Enders soils are on hillsides, mountainsides, and ridges. The well drained Mountainburg soils are on ridgetops and ledges. Also included are soils similar to Steprock soil except that they are deeper than 40 inches to bedrock and soils similar to Nella soil that are on north aspects and have a browner subsoil. A few areas of rock outcrop are also included in this map unit.

Important soil properties:

Permeability: moderate
Available water capacity: Nella soil—moderate; Steprock soil—low
Soil reaction: strongly acid to very strongly acid throughout
Surface runoff: rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet
Depth to bedrock: Nella soil—more than 60 inches; Steprock soil—20 to 40 inches (soft)

Most areas of this map unit are in woodland. A few areas are used for native pasture, and a few areas are used for urban development.

The soils in this map unit are poorly suited to pasture. In many uncleared areas, there is an understory of native grasses. Proper stocking, timely deferment of grazing, fire prevention, and brush control help to keep the native pasture and soil in good condition and help to control erosion. Surface stones and slope restrict the use of farm equipment.

These soils are unsuited to cultivated crops. Surface stones and steep slopes severely restrict the use of farm equipment.

The potential productivity of the soils for commercial wood products is moderate. Adapted species include shortleaf pine, loblolly pine, eastern redcedar, and southern red oak. These soils have moderate limitations for equipment use because of steep slopes and surface stones. Erosion is also a moderate hazard because of steep slopes on both soils. Steprock soil is moderately deep to bedrock, which restricts rooting depth. A high content of gravel in the subsoil reduces the amount of moisture available to the plant roots. Seedling mortality can be reduced by keeping compaction to a minimum so that the infiltration rate remains high for critical summer rains.

The soils in this map unit are poorly suited to most urban uses. Slope is a severe limitation in both Nella and Steprock soils for dwellings, small commercial buildings, local roads and streets, and septic tank absorption fields. Steprock soil also has a severe limitation for septic tank absorption fields because of depth to rock. All of these limitations are difficult to overcome and require special consideration in design, construction, or installation.

These soils are in capability subclass VIIs and in woodland suitability group 4x2.

24—Sidon fine sandy loam, 1 to 3 percent slopes. This soil is deep, nearly level, and moderately well drained. It is on upland plateaus and broad benches. Individual areas range from 10 to 100 acres or more.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 6 inches, brown fine sandy loam
Subsoil:
6 to 15 inches, strong brown clay loam
15 to 24 inches, yellowish brown clay loam
24 to 39 inches, compact and brittle, strong brown clay loam that has gray, reddish brown, and pale brown mottles
39 to 48 inches, strong brown sandy clay loam that has red and gray mottles
Bedrock:
48 to 50 inches, horizontal bedded, hard sandstone bedrock

Included with this soil in mapping are a few small areas of Cane, Enders, Leadvale, Linker, and Steprock soils. The moderately well drained Cane soils are on convex slopes of small hills and on toe slopes of hills and mountains. The well drained Enders soils are on hillsides, mountainsides, and ridges. The moderately well drained Leadvale soils are in similar positions on the landscape. The well drained Linker soils are on hillsides, ridgetops, and benches. The well drained Steprock soils are on hillsides and ridges.

Important soil properties:

Permeability: slow
Available water capacity: moderate
Soil reaction: strongly acid to extremely acid throughout
Surface runoff: medium
Erosion hazard: moderate
Water table: perched within 2 to 3 feet of the surface during winter and early in spring
Depth to bedrock: 40 to 60 inches or more

This soil is well suited to pasture and hayland, and this is the main use. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza. There are no significant limitations for pasture. Good management practices include deferred grazing, rotation grazing, weed and brush control, and proper stocking.

This soil is well suited to cultivated crops. Adapted crops include soybeans, grain sorghum, winter small grains, and truck crops. Erosion is a moderate hazard if row crops are grown. Minimum tillage, proper management of crop residue, cover crops, and contour farming are practices that can reduce runoff and control erosion.

The potential productivity of this soil for commercial wood products is moderately high. Adapted species include loblolly pine, shortleaf pine, southern red oak, and white oak. Sidon soil has no significant limitation for woodland use and management.

This soil is moderately suited to most urban uses. Wetness is a moderate limitation for dwellings and small commercial buildings. Installing tile drains by footings, shaping of the site so surface water moves away from dwellings and runoff is diverted from dwellings, or placing dwellings in high areas can help overcome this limitation. Low strength is a moderate limitation for local roads and streets. Providing subgrade or base material helps to prevent damage to roads and streets. Wetness is a moderate limitation for local roads and streets. Constructing roads on raised fill material or installing a drainage system can help overcome this limitation. Wetness and slow permeability are severe limitations for septic tank absorption fields. Installing a drainage system around the absorption field or enlarging the absorption field can help minimize the affects of these limitations. A specially designed system or an alternate system may have to be used.

This soil is in capability subclass IIe and in woodland suitability group 3o7.

25—Sidon fine sandy loam, 3 to 8 percent slopes. This soil is deep, gently sloping, and moderately well drained. It is on upland plateaus and broad benches. Individual areas range from 10 to 80 acres or more.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 6 inches, brown fine sandy loam
Subsoil:
6 to 15 inches, strong brown clay loam
15 to 24 inches, yellowish brown clay loam
24 to 39 inches, compact and brittle, strong brown clay loam that has gray, reddish brown, and pale brown mottles
39 to 48 inches, strong brown sandy clay loam that has red and gray mottles.
Bedrock:
48 to 50 inches, horizontal bedded, hard sandstone

Included with this soil in mapping are Cane, Enders, Leadvale, Linker, and Steprock soils. The moderately well drained Cane soils are on convex slopes of small hills and on toe slopes of hills and mountains. The well drained Enders soils are on hillsides, mountainsides, and ridges. The moderately well drained Leadvale soils are in similar positions on the landscape. The moderately deep Linker soils are on hillsides, ridgetops, and benches. The

moderately deep Steprock soils are on hillsides and ridges.

Important soil properties:

Permeability: slow
Available water capacity: moderate
Soil reaction: strongly acid to extremely acid throughout
Surface runoff: medium
Erosion hazard: severe
Water table: perched within 2 to 3 feet of the surface during winter and early in spring
Depth to bedrock: 40 to 60 inches or more

This soil is well suited to pasture, and this is the main use. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, white clover, annual lespedeza, and sericea lespedeza. There are no significant limitations for pasture. Good management practices include deferred grazing, rotation grazing, weed and brush control, and proper stocking.

This soil is moderately suited to cultivated crops. Adapted crops include soybeans, grain sorghum, winter small grains, and truck crops. Erosion is a severe hazard if row crops are grown. If there is adequate erosion control, clean-tilled crops can be grown. Terraces, contour cultivation, minimum tillage, proper management of crop residue, and the use of cover crops can reduce runoff and help control erosion. Conservation practices need to be intensified as the length and gradient of the slope increase.

The potential productivity of this soil for commercial wood products is moderately high. Adapted species include loblolly pine, shortleaf pine, southern red oak, and white oak. Sidon soil has no significant limitations for woodland use and management.

This soil is moderately suited to most urban uses. Wetness is a moderate limitation for dwellings and small commercial buildings. Installing tile drains by footings, shaping of the site so surface water moves away from dwellings and runoff is diverted from dwellings, or placing dwellings in high areas of the map unit can help overcome this limitation. Slope is also a moderate limitation for small commercial buildings. Landshaping or adapting designs to conform to the natural slope can help overcome this limitation. Wetness is a moderate limitation for local roads and streets. Constructing roads on raised fill material or installing a drainage system can help overcome this limitation. Low strength is also a moderate limitation for local roads and streets. Providing suitable subgrade or base material helps to prevent damage to roads and streets. Wetness and slow permeability are severe limitations for septic tank absorption fields. Installing a drainage system around the absorption field or enlarging the absorption field can help minimize the affects of these limitations. A specially designed system or an alternate system may have to be used.

This Sidon soil is in capability subclass IIIe and in woodland suitability group 3o7.

26—Spadra loam, 0 to 1 percent slopes. This soil is deep, level, and well drained. It is on stream terraces, which mainly are along the Little Red River and its tributaries. Flood control in these areas is provided by Greers Ferry Dam; however, flooding is possible under abnormal conditions. Individual areas range from about 10 to 80 acres or more.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 6 inches, dark brown loam
Subsoil layer:
6 to 36 inches, brown loam
36 to 50 inches, brown fine sandy loam
Substratum:
50 to 72 inches, reddish brown fine sandy loam

Included with this soil in mapping are small areas of Barling, Guthrie, and Dela soils. The moderately well drained Barling soils are on flood plains. The poorly drained Guthrie soils are on upland flats and in low depressions. The well drained Dela soils are on natural levees along the Little Red River. Also included are a few small areas with less sand in the subsoil and a few small areas that are occasionally flooded.

Important soil properties:
Permeability: moderate
Available water capacity: high
Soil reaction: medium acid to very strongly acid throughout
Surface runoff: slow
Erosion hazard: slight
Depth to water table: more than 6 feet
Depth to bedrock: more than 60 inches

This soil is well suited to pasture and hayland, and this is the main use. Adapted pasture plants include common bermudagrass, tall fescue, bahiagrass, white clover, sericea lespedeza, and annual lespedeza. There are no significant limitations for pasture. Good management practices include deferred grazing, rotation grazing, weed and brush control, and proper stocking.

This soil is well suited to cultivated crops. Adapted crops include soybeans (fig. 9), grain sorghum, corn, and winter small grains (fig. 10). There are no significant limitations for cultivated crops. Good management practices include minimum tillage, cover crops, and crop residue management.

This soil has high potential productivity for commercial wood products. Adapted species include loblolly pine, shortleaf pine, and southern red oak. There are no significant limitations for woodland management.

This soil is normally protected from flooding by Greers Ferry Dam. This area, however, is subject to rare flooding under abnormal weather conditions. Dwellings and small commercial buildings have a severe limitation because of rare flooding. Local roads and streets have a moderate limitation because of possible rare flooding. Septic tank absorption fields have moderate limitations because of rare flooding and moderate permeability. Enlarging the absorption field and constructing wide, deep trenches below distribution lines may help to minimize the effects of moderate permeability.

This soil is in capability class I and in woodland suitability group 2o7.

27—Spadra loam, occasionally flooded. This soil is deep, level to nearly level, and well drained. It is on stream terraces. Flooding is infrequent under normal weather conditions and usually occurs for brief periods from December to April. Individual areas range from about 10 to 100 acres or more. Slopes range from 0 to 2 percent.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 6 inches, dark brown loam
Subsoil:
6 to 36 inches, brown loam
36 to 50 inches, brown fine sandy loam

Figure 9.—A young stand of soybeans is growing on Spadra loam, 0 to 1 percent slopes. This soil is well suited to cultivated crops.

Figure 10.—This wheat crop is in an area of Spadra loam, 0 to 1 percent slopes.

Substratum:
50 to 72 inches, reddish brown fine sandy loam

Included with this soil in mapping are small areas of Barling, Guthrie, and Dela soils. The moderately well drained Barling soils are on flood plains. The poorly drained Guthrie soils are on upland flats and in low depressions. The well drained Dela soils are on natural levees along the Little Red River.

Important soil properties:

Permeability: moderate
Available water capacity: high
Soil reaction: medium acid to very strongly acid throughout
Surface runoff: slow
Erosion hazard: slight
Depth to water table: more than 6 feet
Depth to bedrock: more than 60 inches

This soil is well suited to pasture, and this is the main use (fig. 11). Adapted pasture plants include common bermudagrass, tall fescue, bahiagrass, white clover, sericea lespedeza, and annual lespedeza. Occasional flooding is a moderate limitation. Good management practices include deferred grazing, rotation grazing, weed and brush control, and proper stocking.

This soil is well suited to cultivated crops. Adapted crops include soybeans, grain sorghum, and corn. Occasional flooding during the winter and early in the spring is the main limitation for crop production. Minimum tillage and proper management of crop residue help to control erosion.

The potential productivity of this soil for commercial wood products is high. Adapted species include loblolly pine, shortleaf pine, and southern red oak. There are no

Figure 11.—An area of pasture is in the foreground on Spadra loam, occasionally flooded.

significant limitations for woodland use and management.

This soil is poorly suited to most urban uses. Occasional flooding is a severe hazard for dwellings, small commercial buildings, local roads and streets, and septic tank absorption fields. This limitation is generally difficult or impractical to overcome without major flood control measures.

This soil is in capability subclass IIw and in woodland suitability group 2o7.

28—Spadra-Dela complex, 0 to 5 percent slopes. This complex consists of well drained, deep, level to gently sloping, loamy and sandy soils. They are on terraces and natural levees along the Little Red River and its tributaries. This map unit is normally protected from flooding by Greers Ferry Dam, but these soils are subject to rare flooding under abnormal weather conditions.

Spadra and Dela soils are in areas that are so small or so intricately mixed that it was not practical to map them separately. This complex is about 55 percent Spadra soil, 30 percent Dela soil, and 15 percent included soils. Individual areas range from 20 to 150 acres or more.

The typical sequence, depth, color, and texture of the layers of Spadra soils are as follows:

Surface layer:
mineral surface to 6 inches, dark brown loam
Subsoil:
6 to 36 inches, brown loam
36 to 50 inches, brown fine sandy loam

Substratum:
50 to 72 inches, reddish brown fine sandy loam

The typical sequence, depth, color, and texture of the layers of Dela soil are as follows:

Surface layer:
mineral surface to 10 inches, dark brown and brown loamy fine sand
Substratum:
10 to 21 inches, strong brown fine sandy loam
21 to 31 inches, strong brown stratified loamy fine sand, fine sandy loam, and silt loam
31 to 47 inches, yellowish brown loamy fine sand
47 to 57 inches, yellowish brown fine sandy loam
57 to 72 inches, pale brown very fine sandy loam

Included with these soils in mapping are areas of Barling and Guthrie soils. The moderately well drained Barling soils are on flood plains. The poorly drained Guthrie soils are on upland flats and in low depressions. Also included are soils similar to Spadra soil except that they have less sand in the subsoil, and areas that have slopes of more than 5 percent. Areas along small creeks that are occasionally flooded are also included.

Important soil properties:

Permeability: Spadra soil—moderate; Dela soil—moderately rapid
Available water capacity: Spadra soil—high; Dela soil—low
Soil reaction: medium acid to very strongly acid throughout
Surface runoff: slow
Erosion hazard; moderate
Depth to water table: Spadra soils—more than 6 feet; Dela soils—4 to 6 feet during winter and early in spring
Depth to bedrock: more than 60 inches

The soils in this map unit are well suited to pasture and hayland, and this is the main use. Adapted pasture plants include bahiagrass, bermudagrass, tall fescue, and sericea lespedeza. The Spadra soil has no significant limitations for pasture use and management. Droughtiness during the summer is a moderate limitation on Dela soil. Good management practices that help maintain pasture productivity are deferred grazing, rotation grazing, weed and brush control, and proper stocking.

These soils are moderately suited to cultivated crops. Adapted crops include soybeans, winter small grains, and grain sorghum. Water erosion is a moderate hazard on the Spadra soils. Minimum tillage, proper management of crop residue, and the use of cover crops can reduce runoff and control erosion. Droughtiness and wind erosion are moderate hazards on Dela soil. Minimum tillage, proper management of crop residue, and the use of cover crops can reduce runoff and wind erosion. Conservation practices need to be intensified as the gradient and length of the slope increase.

The potential productivity of these soils for commercial wood products is high. Adapted species include loblolly pine, shortleaf pine, southern red oak, and sweet gum. Spadra soil has no significant limitations for woodland. Seedling mortality is a moderate hazard on Dela soil because of the high content of sand in the surface layer, which reduces the available water capacity. Some reinforcement planting may be needed.

These soils are normally protected from flooding by Greers Ferry dam. This area however, is subject to rare flooding during abnormal weather conditions. These soils are limited for most urban uses because of possible flooding. Rare flooding is a severe limitation for dwellings and small commercial buildings and a moderate limitation for local roads and streets. Spadra soil has moderate limitations for septic tank absorption fields because of possible rare flooding and moderate permeability. Enlarging the absorption field and constructing wide, deep trenches below distribution lines can help minimize the effect of moderate permeability. Dela soil has moderate limitations for septic tank absorption fields because of wetness and possible rare flooding. Constructing drainage systems around absorption fields, installing diversions to intercept water from higher areas, and constructing a specially designed system or an alternate system can help overcome these limitations.

These soils are in capability subclass IIIe. Spadra soil is in woodland suitability group 2o7. Dela soil is in woodland suitability group 2s8.

29—Steprock-Linker complex, 3 to 8 percent slopes. This complex consists of well drained, moderately deep, gently sloping soils. Steprock soil is moderately deep and generally is on the upper part of hillsides and ridgetops. Linker soil is moderately deep and generally is on the lower part of hillsides.

The Steprock and Linker soils are in areas that are so small or so intricately mixed that it was not practical to map them separately. This complex is about 50 percent Steprock soil, 30 percent Linker soil, and 20 percent other soils. Individual areas range from 20 to 250 acres or more.

The typical sequence, depth, color, and texture of the layers of Steprock soil are as follows:

Surface layer:
mineral surface to 4 inches, dark brown gravelly fine sandy loam
Subsoil layer:
4 to 8 inches, strong brown gravelly loam
8 to 27 inches, yellowish red very gravelly loam
Substratum:

27 to 46 inches, yellowish red weathered sandstone (soft)

The typical sequence, depth, color, and texture of the layers of Linker soil are as follows:

Surface layer:
mineral surface to 5 inches, dark brown gravelly fine sandy loam
Subsoil:
5 to 12 inches, strong brown loam
12 to 24 inches, yellowish red loam
24 to 32 inches, yellowish red sandy clay loam
Bedrock:
32 to 35 inches, hard, level-bedded acid sandstone

Included with these soils in mapping are areas of Enders, Sidon, and Mountainburg soils. The well drained Enders soils are on hillsides, mountainsides, and ridges. Moderately well drained Sidon soils are on upland plateaus and broad benches. Shallow, well drained Mountainburg soils are on ridgetops and ledges. Also included are small areas that have slopes of more than 8 percent, and a few small areas that have cobbles and stones on the surface.

Important soil properties:

Permeability: moderate
Available water capacity: low
Soil reaction: Steprock soil—strongly acid or very strongly acid throughout; Linker soil—strongly acid to extremely acid throughout
Surface runoff: medium
Erosion hazard: severe
Depth to water table: more than 6 feet
Depth to bedrock: Steprock soil—20 to 40 inches (soft); Linker soil—20 to 40 inches (hard)

The soils in this map unit are well suited to pasture, and most cleared areas are used for this purpose (fig. 12). Adapted species include bahiagrass, bermudagrass, tall fescue, annual lespedeza, and sericea lespedeza. Good management practices that help to maintain pasture productivity include deferred grazing, rotation grazing, weed and brush control, and proper stocking.

The soils in this map unit are moderately suited to cultivated crops. Adapted crops include soybeans, grain sorghum, and winter small grains. Steprock and Linker soils have moderate limitations because of the low available water capacity and because of depth to bedrock which restricts root growth. Most plants will show stress during dry periods. If there is adequate erosion control, clean-tilled crops can be grown. Terraces, contour cultivation, minimum tillage, proper management of crop residue, and cover crops can reduce runoff and help to control erosion. Conservation practices will need to be intensified as the length and gradient of the slope increase.

The potential productivity of these soils for commercial wood products is moderate. Adapted species include loblolly pine (fig. 13), shortleaf pine, southern red oak, white oak, and eastern redcedar. These soils have no significant management limitations for woodland.

These soils are moderately suited to most urban uses. Steprock soil has no significant limitations for dwellings and local roads and streets. Slope is a moderate limitation for small commercial buildings. Shaping the land and designing structures to conform to the natural slope can help overcome this limitation. Depth to bedrock is a severe limitation for septic tank absorption fields. This limitation is difficult to overcome and may require a specially designed system or an alternate system. Linker soil has moderate limitations for dwellings and local roads and streets because of depth to bedrock. Constructing buildings above the bedrock and landscaping with additional fill can help overcome this limitation. Planning grades and locations to avoid removal of rock, ripping the rock when soft, and blasting the rock when hard can help overcome the effects of the limited depth to bedrock. Linker soil has moderate limitations for small commercial buildings because of depth to bedrock and slope. Building structures above bedrock and landscaping with additional fill can help overcome the limited depth to bedrock. Designing structures to conform to the natural slope and shaping the land can help overcome the limitation of slope. Depth to bedrock is a severe limitation for septic tank absorption fields. This limitation is difficult to overcome and may require a specially designed system or an alternate system.

These soils are in capability subclass IIIe and in woodland suitability group 4o1.

30—Steprock-Mountainburg complex, 3 to 8 percent slopes. This complex consists of well drained, moderately deep and shallow, gently sloping soils. Steprock soil is moderately deep and generally is on the lower part of low ridges. Mountainburg soil is shallow and is on the upper part of low ridges.

The Steprock and Mountainburg soils are in areas that are so small or so intricately mixed that it was not practical to map them separately. This complex is about 50 percent Steprock soil, 30 percent Mountainburg soil, and 20 percent included soils. Individual areas range from 20 to 150 acres or more.

The typical sequence, depth, color, and texture of the layers of the Steprock soil are as follows:

Surface layer
mineral surface to 4 inches, dark brown gravelly fine sandy loam
Subsoil layer:
4 to 8 inches, strong brown gravelly loam
8 to 27 inches, yellowish red very gravelly loam
Substratum:

Figure 12.—An area of pasture is on Steprock-Linker complex, 3 to 8 percent slopes. In areas where these soils are cleared, they are used mainly for forage production.

27 to 46 inches, yellowish red weathered sandstone (soft)

The typical sequence, depth, color, and texture of the layers of the Mountainburg soil are as follows:

Surface layer:
mineral layer to 2 inches, very dark grayish brown gravelly fine sandy loam
Subsurface layer:
2 to 7 inches, yellowish brown gravelly fine sandy loam
Subsoil:
7 to 17 inches, strong brown very gravelly sandy clay loam
Bedrock:
17 to 20 inches, hard level-bedded sandstone bedrock

Included with these soils in mapping are areas of Enders and Linker soils. The well drained Enders soils are on hillsides, mountainsides, and ridges. The well drained Linker soils are on hillsides, ridges, and benches. Also included are a few small areas that have slopes of more than 8 percent and areas that have cobbles and stones on the surface.

Important soil properties:

Permeability: Steprock soil—moderate; Mountainburg soil—moderately rapid
Available water capacity: Steprock soil—low; Mountainburg soil—very low
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: medium
Erosion hazard: severe
Depth to water table: more than 6 feet
Depth to bedrock: Steprock soil—20 to 40 inches (soft); Mountainburg soil—10 to 20 inches (hard)

Steprock soil is well suited and Mountainburg soil is moderately suited to pasture, and most cleared areas are used for this purpose. Adapted species include bahiagrass, bermudagrass, annual lespedeza, and

Figure 13.—Managed stands of loblolly pine are in an area of Steprock-Linker complex, 3 to 8 percent slopes.

sericea lespedeza. Depth to rock and the very low available water capacity are moderate limitations on Mountainburg soils. Good management practices that help to maintain pasture productivity include deferred grazing, rotation grazing, weed and brush control, and proper stocking.

Steprock soil is moderately suited to cultivated crops, and Mountainburg soil is poorly suited to cultivated crops. Steprock soil has low available water capacity, and Mountainburg soil has very low available water capacity. Contour cultivation, minimum tillage, proper management of crop residue, and cover crops can reduce runoff and help to control erosion. Conservation practices need to be intensified as the length and gradient of the slope increase. Because the Steprock soil is moderately deep to bedrock and the Mountainburg soil is shallow to bedrock, the root depth of these soils is restricted.

The potential productivity of Steprock soil for commercial wood products is moderate, and potential productivity of Mountainburg soil is low. Adapted species include shortleaf pine, loblolly pine, and eastern redcedar. Seedling mortality and windthrow hazard are concerns in management on the Mountainburg soil.

Steprock soil is moderately suited to most urban uses. There are no significant limitations for dwellings and local roads and streets. Slope is a moderate limitation for small commercial buildings. Designing structures to conform to the natural slope and shaping the land can help overcome this limitation. Depth to bedrock is a severe limitation for septic tank absorption fields. This limitation is difficult to overcome and may require a specially designed system or an alternate system.

Mountainburg soil is poorly suited to most urban uses. Depth to bedrock is a severe limitation for dwellings and small commercial buildings. Building structures above bedrock and landscaping with additional fill can help overcome this limitation. Depth to bedrock is a severe limitation for local roads and streets. Planning grades and locations to avoid removal of rock, ripping the rock when soft, and blasting the rock when hard can help overcome this limitation. Septic tank absorption fields have severe limitations because of depth to bedrock. This limitation is generally difficult or impractical to overcome and may require an alternate system.

These soils are in capability subclass IVe. Steprock soil is in woodland suitability group 4o1. Mountainburg is in woodland suitability group 5d2.

31—Steprock-Mountainburg complex, 8 to 20 percent slopes. This complex consists of well drained, moderately deep and shallow, moderately sloping to moderately steep soils. Steprock soil is moderately deep and generally is on the lower part of hillsides and ridgetops. Mountainburg soil is shallow and is on the upper part of hillsides and narrow ledges.

The Steprock and Mountainburg soils are in areas that are so small or so intricately mixed that it was not practical to map them separately. This complex is about 50 percent Steprock soil, 30 percent Mountainburg soil, and 20 percent included soils. Individual areas range from 10 to 1,000 acres or more.

Typically, Steprock soil is covered by a thin layer of decomposed and partly decomposed leaves, needles, and twigs. Below this layer, the typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
mineral surface to 4 inches, dark brown stony fine sandy loam
Subsoil:
4 to 8 inches, strong brown gravelly loam
8 to 27 inches, yellowish red very gravelly loam
Substratum:
27 to 46 inches, yellowish red weathered sandstone (soft)

Typically, Mountainburg soil is covered by a thin layer of decomposed and partly decomposed leaves, needles, and twigs. Below this layer, the typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
mineral layer to 2 inches, very dark grayish brown stony fine sandy loam
Subsurface layer:
2 to 7 inches, yellowish brown stony fine sandy loam
Subsoil:
7 to 17 inches, strong brown very gravelly sandy clay loam
Bedrock:
17 to 20 inches, hard, level-bedded sandstone bedrock

Included with these soils in mapping are areas of Enders and Linkers soils. The well drained Enders soils are on hillsides, mountainsides, and ridges. The well drained Linker soils are on hillsides, ridges, and benches. Also included are a few small areas that have slopes of more than 20 percent and a few areas of rock outcrop.

Important soil properties:
Permeability: Steprock soil—moderate; Mountainburg soil—moderately rapid
Available water capacity: Steprock soil—low; Mountainburg soil—very low
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet
Depth to bedrock: Steprock soil—20 to 40 inches (soft); Mountainburg soil—10 to 20 inches (hard).

Most areas of this map unit are in woodland. A few areas are used for pasture and urban development.

The soils in this map unit are poorly suited to pasture and unsuited to cultivated crops. Where pasture is established, plants include tall fescue and native grasses. In some areas, these soils can be used for native grass pasture if brush can be controlled; however, controlled grazing and fire protection are needed to maintain soil cover and prevent excessive erosion. Surface stones and slope restrict the use of farm equipment. Mountainburg soils are also shallow to bedrock and have very low available water capacity.

The potential productivity of Steprock soils for commercial wood products is moderate, and potential productivity of Mountainburg soils is low. Adapted species include shortleaf pine, loblolly pine, and eastern redcedar. Both soils have limitations for equipment use because of stones on the surface. In addition, seedling mortality and windthrow hazard are concerns in management on the Mountainburg soil because of the limited rooting depth.

These soils are moderately suited to poorly suited to most urban uses. Because of slope, Steprock soil has a severe limitation for small commercial buildings and a moderate limitation for dwellings and local roads and streets. Building structures to conform to the natural slope and shaping the land can help overcome the limitation for dwellings and small commercial buildings. Constructing roads on the contour, land shaping and grading, and adapting designs to the slope can help overcome the limitation for local roads and streets. Steprock soil has a severe limitation for septic tank absorption fields because of depth to bedrock. This limitation is difficult to overcome and may require the use of an alternate system. Mountainburg soil has a severe limitation for dwellings, small commercial buildings, local roads and streets, and septic tank absorption fields because of depth to rock. Building structures above rock and landscaping with additional fill can help overcome the limitation of depth to rock for dwellings and small commercial buildings. Planning grades and locations to avoid removal of rock, ripping the rock when soft, and blasting the rock when hard can help overcome the depth to rock limitation for local roads and streets. Depth to rock is also a severe limitation for septic tank

absorption fields on Mountainburg soil. This limitation is difficult or impractical to overcome and may require the use of an alternate system.

These soils are in capability subclass VIs. Steprock soil is in woodland suitability group 4x2. Mountainburg soil is in woodland suitability group 5x3.

32—Steprock-Mountainburg-Rock outcrop complex, 40 to 60 percent slopes. This complex consists of well drained, moderately deep and shallow, very steep, loamy and stony soils. Steprock soil is moderately deep and generally is on very steep sides of hills, mountains, and ridges. Mountainburg soil is shallow and generally is on narrow ledges. Rock outcrop is generally on very steep slopes of valley walls and near vertical bluffs (fig. 14). Typically, there are stones, cobbles, and gravel on the surface in all areas; stones are the most limiting factor.

The Steprock and Mountainburg soils and Rock outcrop are in areas that are so small or so intricately mixed that it was not practical to map them separately. This complex is about 35 percent Steprock soil, 25 percent Mountainburg soil, 20 percent Rock outcrop, and 20 percent included soils. Individual areas range from about 20 to 1,000 acres or more.

Typically, the Steprock soil is covered by a thin layer of decomposed and partly decomposed leaves, needles, and twigs. Below this layer, the typical sequence, depth,

Figure 14.—Rock outcrop in an area of Steprock-Mountainburg-Rock outcrop complex, 40 to 60 percent slopes.

color, and texture of the layers of these soils are as follows:

Surface layer:
mineral surface to 2 inches, dark brown stony fine sandy loam
Subsoil layer:
2 to 8 inches, strong brown gravelly loam
8 to 27 inches, yellowish red very gravelly loam
Substratum:
27 to 46 inches, yellowish red weathered soft sandstone

Typically, Mountainburg soil is covered by a thin layer of decomposed and partly decomposed leaves, needles, and twigs. Under this layer, the typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
mineral surface to 2 inches, very dark grayish brown stony fine sandy loam
Subsurface layer:
2 to 7 inches, yellowish brown stony fine sandy loam
Subsoil:
7 to 17 inches, strong brown very gravelly sandy clay loam
Bedrock:
17 to 20 inches, hard sandstone bedrock

Included with these soils in mapping are small areas of Enders and Nella soils. The well drained Enders soils are on hillsides, mountainsides, and ridges. The well drained Nella soils are on hillsides, mountainsides, foot slopes, and benches. Also included are small areas of shale breaks and small areas of soils similar to Steprock soil except they are more than 40 inches deep to bedrock. Also there are small areas that have boulders on the surface.

Important soil properties:

Permeability: Steprock soil—moderate; Mountainburg soil—moderately rapid
Available water capacity: Steprock soil—low; Mountainburg soil—very low.
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet
Depth to bedrock: Steprock soil—20 to 40 inches (soft); Mountainburg soil—12 to 20 inches (hard)

The soils in this map unit are severely limited for pasture. In some uncleared areas, there is an understory of native grasses. Proper stocking, timely deferment of grazing, fire prevention, and brush control help to keep the native grass pasture and soil in good condition and control erosion. Very steep slopes and surface stones prevent the use of farm equipment.

The soils in this map unit are unsuited to cultivated crops. These soils have rapid surface runoff, a very severe erosion hazard, very steep slopes, surface stones, and Rock outcrop. Use of farm equipment is not practical.

Most areas of this map unit are in woodland, and this is the best use. The potential productivity of the soils in this map unit for commercial wood products is low. Adapted species include eastern redcedar, shortleaf pine, and loblolly pine. Use of equipment is severely limited because of steep slopes and surface stones. The hazard of erosion is severe on both soils, and seedling mortality is a limitation on both soils.

The soils in this map unit are severely limited for most urban uses. Steprock soil has severe limitations for dwellings, small commercial buildings, local roads and streets, and septic tank absorption fields because of steep slopes. Also depth to bedrock is a severe limitation for septic tank absorption fields on Steprock soil. Mountainburg soil has severe limitations for dwellings, small commercial buildings, local roads and streets, and septic tank absorption fields because of steep slopes and depth to bedrock. These limitations are difficult or impractical to overcome.

These soils are in capability subclass VIIs. Steprock soil is in woodland suitability group 5r3, and Mountainburg soil is in woodland suitability group 5x3.

33—Steprock-Nella-Mountainburg complex, 20 to 40 percent slopes. This complex consists of well-drained, deep to shallow, steep, loamy and stony soils. Steprock soil is moderately deep and typically is on the upper part of side slopes and on tops of hills, mountains, and ridges. Nella soil is deep and typically is in the more colluvial positions on hillsides, mountainsides, toe slopes, and concave parts of benches. Mountainburg soil is shallow and typically is on ridgetops and narrow ledges. Typically, there are stones, cobbles, and gravel on the surface in all areas; stones are the most limiting factor.

The Steprock, Nella, and Mountainburg soils are in areas that are so small or so intricately mixed that it was not practical to map them separately. This complex is about 50 percent Steprock, 20 percent Nella soil, 15 percent Mountainburg soil, and 15 percent included soils. Individual areas range from about 80 to more than 500 acres.

Typically, Steprock soil is covered by a thin layer of decomposed and partly decomposed leaves, needles, and twigs. Under this layer, the typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
mineral surface to 2 inches, dark brown stony fine sandy loam

Subsoil:
2 to 8 inches, strong brown gravelly loam
8 to 27 inches, yellowish red very gravelly loam
Substratum:
27 to 46 inches, yellowish red, weathered sandstone (soft)

Typically, the Nella soil is covered by a thin layer of partially decomposed and decomposed leaves, needles, and twigs. Under this layer, the typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
mineral surface to 3 inches, dark grayish brown stony fine sandy loam
Subsurface layer:
3 to 10 inches, yellowish brown gravelly fine sandy loam
Subsoil:
10 to 42 inches, yellowish red gravelly sandy clay loam
42 to 54 inches, yellowish red very gravelly sandy clay loam
54 to 72 inches, red very gravelly sandy clay loam

Typically, Mountainburg soil is covered by a thin layer of partially decomposed and decomposed leaves, needles, and twigs. Under this layer, the typical sequence, depth, and composition of the layers of this soil are as follows:

Surface layer:
mineral layer to 2 inches, very dark grayish brown stony fine sandy loam
Subsurface layer:
2 to 7 inches, yellowish brown stony fine sandy loam
Subsoil:
7 to 17 inches, strong brown very gravelly sandy clay loam
Bedrock:
17 to 20 inches, hard, level-bedded sandstone

Included with these soils in mapping are areas of Enders and Linker soils. The well drained Enders soils are on sides of hills, mountains, and ridges. The well drained Linker soils are on hillsides, ridges, and benches. Also included are a few small areas where the slopes are more than 40 percent and a few areas of rock outcrop.

Important soil properties:

Permeability: Steprock and Nella soils—moderate; Mountainburg soil—moderately rapid
Available water capacity: Steprock soil—low; Nella soil—moderate; Mountainburg soil—very low
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: rapid
Erosion hazard: very severe
Depth to water table: more than 6 feet
Depth to bedrock: Steprock soil—20 to 40 inches (soft); Nella soil—more than 60 inches; Mountainburg soil—10 to 20 inches (hard)

The soils in most areas of this map unit are in woodland. In a few areas they are used for native pasture and urban development.

The soils in this map unit are unsuited to cultivated crops and are severely limited for pasture. Steep slopes and surface stones restrict the use of farm equipment.

The potential productivity of Steprock and Nella soils for commercial wood products is moderate, and potential productivity of Mountainburg soil is low. Adapted species include shortleaf pine, loblolly pine, eastern redcedar, southern red oak, post oak, and hickory. Steprock and Nella soils have moderate equipment limitations because of steep slopes and surface stones. Mountainburg soil has moderate or severe equipment limitations because of steep slopes and surface stones. The restricted rooting depth is a concern in management on Steprock and Mountainburg soils. Seedling mortality can be reduced by limiting compaction so that infiltration rates remain high for critical summer rains.

The soils in this map unit are poorly suited to most urban uses. Steep slope is a severe limitation for dwellings, small commercial buildings, local roads and streets, and septic tank absorption fields. Steprock soils have severe limitation for septic tank absorption fields because of depth to bedrock. Mountainburg soils have severe limitation for dwellings, small commercial buildings, local roads and streets, and septic tank absorption fields because of depth to rock. These limitations are difficult to overcome and require special consideration in design, construction, or installation. In some areas, urban use is impractical on these soils.

The soils in this map unit are in capability subclass VIIs. Steprock and Nella soils are in woodland suitability group 4x2, and Mountainburg soil is in woodland suitability group 5x3.

34—Taft silt loam, 0 to 2 percent slopes. This soil is deep, level to nearly level, and somewhat poorly drained. It is on stream terraces, on upland flats, and in depressions. Individual areas range from 10 to 80 acres or more.

The typical sequence, depth, color, and texture of the layers of this soil are as follows:

Surface layer:
surface to 4 inches, dark grayish brown silt loam
Subsurface layer:
4 to 10 inches, pale brown silt loam
Subsoil:
10 to 23 inches, yellowish brown silt loam that has light brownish gray and strong brown mottles

23 to 30 inches, compact and brittle, light yellowish brown and light brownish gray silt loam
30 to 43 inches, compact and brittle, light yellowish brown silty clay loam that has gray and strong brown mottles
43 to 57 inches, compact and brittle, light yellowish brown and gray silty clay loam that has strong brown and yellowish red mottles
57 to 72 inches, yellowish red silty clay loam that has gray, strong brown, and light yellowish brown mottles

Included with this soil in mapping are small areas of Barling, Guthrie, and Leadvale soils. The moderately well drained Barling soils are on flood plains. The poorly drained Guthrie soils are on upland flats and in depressions. The moderately well drained Leadvale soils are on colluvial foot slopes and old stream terraces. Also included are a few small areas with circular mounds.

Important soil properties:

Permeability: slow
Available water capacity: moderate
Soil reaction: strongly acid or very strongly acid throughout
Surface runoff: slow
Erosion hazard: slight
Water table: perched within 1 to 2 feet of the surface during winter and early in spring
Depth to bedrock: more than 60 inches

This soil is moderately suited to pasture, and this is the main use. Adapted pasture plants include bermudagrass, tall fescue, white clover, bahiagrass, and sericea lespedeza. Seasonal wetness is a moderate limitation for pasture. Adequate surface drainage is needed to minimize this limitation. Other good management practices include deferred grazing, rotation grazing, weed and brush control, and proper stocking.

This soil is moderately suited to cultivated crops. Adapted crops might include soybeans, grain sorghum, and winter small grains if surface drainage is adequate. Excess surface water is a severe limitation because runoff is slow and seepage is received from adjacent slopes. Farming operations are often delayed several days after a rain. Adequate surface drainage is needed to minimize this limitation. Other good management practices include minimum tillage and crop residue management.

The potential productivity of this soil for commercial wood products is moderately high. Adapted species include loblolly pine, shortleaf pine, white oak, and sweet gum. Because of wetness, this soil has moderate limitations for equipment use. Wetness increases seedling mortality. The equipment use limitation can be minimized by timing operations to avoid seasonal wetness. Special site preparation, such as bedding or surface drainage, may be needed to reduce seedling mortality.

This soil is poorly suited to most urban uses. Wetness is a severe limitation for dwellings and small commercial buildings. Constructing tile drains by footings, shaping land so surface water moves away from structures, and constructing buildings on raised fill material can help overcome this limitation. Low strength is a severe limitation for local roads and streets. Providing suitable subgrade or base material helps to prevent damage to roads and streets. Wetness and slow permeability are severe limitations for septic tank absorption fields. Installing diversions to intercept water from higher places, constructing a drainage system around absorption fields, and using a specially designed system can help minimize the affects of these limitations.

This soil is in capability subclass IIIw and in woodland suitability group 3w8.

Prime Farmland

In this section, prime farmland is defined and discussed, and the prime farmland soils in Cleburne and Van Buren Counties are listed.

Prime farmland is one of several kinds of important farmland defined by the U.S. Department of Agriculture. It is of major importance in meeting the nation's short- and long-range needs for food and fiber. The acreage of high-quality farmland is limited, and the U.S. Department of Agriculture recognizes that government at local, state, and federal levels, as well as individuals, must encourage and facilitate the wise use of our nation's prime farmland.

Prime farmland soils, as defined by the U.S. Department of Agriculture, are soils that are best suited to producing food, feed, forage, fiber, and oilseed crops. Such soils have properties that are favorable for the economic production of sustained high yields of crops. The soils need only to be treated and managed using acceptable farming methods. The moisture supply, of course, must be adequate, and the growing season has to be sufficiently long. Prime farmland soils produce the highest yields with minimal inputs of energy and economic resources. Farming these soils results in the least damage to the environment.

Prime farmland soils may presently be in use as cropland, pasture, or woodland, or they may be in other uses. They either are used for producing food or fiber or are available for these uses. Urban or built-up land and water areas cannot be considered prime farmland. Urban or built-up land is any contiguous unit of land 10 acres or more in size that is used for such purposes as housing, industrial, and commercial sites, sites for institutions or public buildings, small parks, golf courses, cemeteries, railroad yards, airports, sanitary landfills, sewage treatment plants, and water control structures.

Prime farmland soils usually get an adequate and dependable supply of moisture from precipitation or irrigation. The temperature and growing season are favorable. The acidity or alkalinity level of the soils is acceptable. The soils have few or no rocks and are permeable to water and air. They are not excessively erodible or saturated with water for long periods and are not subject to frequent flooding during the growing season. The slope ranges mainly from 0 to 8 percent.

In Cleburne County, about 43,615 acres, or about 12 percent of the total land area, meets the soil requirements for prime farmland. The soils are scattered throughout the county. In upland areas, these soils are typically on nearly level to gently sloping ridgetops and valley floors. Most of the acreage is used for forage and timber production. The remainder of the prime farmland is on flood plains and terraces of the Little Red River and other streams scattered throughout the county. These areas are used mainly for forage production and row crops. The prime farmland soils in Cleburne County are mainly in map units 3, 5, 6, and 7 on the general soil map. No unique farmland has been identified in this county.

In Van Buren County, about 32,813 acres, or about 7 percent of the total land area, meets the soil requirements for prime farmland. The soils are scattered throughout the county. In upland areas, these soils are typically on nearly level to gently sloping ridgetops and valley floors. Most of the acreage is used for forage and timber production. The remainder of the prime farmland is on flood plains and terraces of the Little Red River and other streams scattered throughout the county. These areas are used mainly for forage production. The prime farmland soils in Van Buren County are mainly in map units 3 and 5 on the general soil map. No unique farmland has been identified in this county.

A recent trend in land use has been the conversion of some prime farmland to urban and industrial uses. The loss of prime farmland to other uses puts pressure on marginal lands, which generally are wet, more erodible, droughty, or difficult to cultivate and less productive than prime farmland.

The following map units, or soils, make up prime farmland in Cleburne and Van Buren Counties. The location of each map unit is shown on the detailed soil maps at the back of this publication. The extent of each unit is given in table 4. The soil qualities that affect use and management are described in the section "Detailed Soil Map Units." This list does not constitute a recommendation for a particular land use.

Soils that have limitations, such as a high water table or flooding, may qualify as prime farmland if these limitations are overcome by such measures as drainage or flood control. In the following list, the measures needed to overcome the limitations of a map unit, if any, are shown in parentheses after the map unit name. Onsite evaluation is necessary to determine if the limitations have been overcome by the corrective measures.

The map units that make up prime farmland in Cleburne County are:

1 Barling silt loam, occasionally flooded
11 Guthrie silt loam, occasionally flooded (where drainage has been provided to allow cultivated crops common to the area to be grown)
13 Leadvale silt loam, 1 to 3 percent slopes
15 Linker fine sandy loam, 3 to 8 percent slopes
16 Linker gravelly fine sandy loam, 3 to 8 percent slopes
21 Nauvoo fine sandy loam, 3 to 8 percent slopes
24 Sidon fine sandy loam, 1 to 3 percent slopes
26 Spadra loam, 0 to 1 percent slopes
27 Spadra loam, occasionally flooded
34 Taft silt loam, 0 to 2 percent slopes

The map units which make up prime farmland in Van Buren County are:

1 Barling silt loam, occasionally flooded
11 Guthrie silt loam, occasionally flooded (where drainage has been provided to allow cultivated crops common to the area to be grown)
13 Leadvale silt loam, 1 to 3 percent slopes
15 Linker fine sandy loam, 3 to 8 percent slopes
16 Linker gravelly fine sandy loam, 3 to 8 percent slopes
21 Nauvoo fine sandy loam, 3 to 8 percent slopes
24 Sidon fine sandy loam, 1 to 3 percent slopes
27 Spadra loam, occasionally flooded
34 Taft silt loam, 0 to 2 percent slopes

Use and Management of the Soils

This soil survey is an inventory and evaluation of the soils in the survey area. It can be used to adjust land uses to the limitations and potentials of natural resources and the environment. Also, it can help avoid soil-related failures in land uses.

In preparing a soil survey, soil scientists, conservationists, engineers, and others collect extensive field data about the nature and behavior characteristics of the soils. They collect data on erosion, droughtiness, flooding, and other factors that affect various soil uses and management. Field experience and collected data on soil properties and performance are used as a basis for predicting soil behavior.

Information in this section can be used to plan the use and management of soils for crops and pasture; as woodland; as sites for buildings, sanitary facilities, highways and other transportation systems, and parks and other recreation facilities; and for wildlife habitat. It can be used to identify the potentials and limitations of each soil for specific land uses and to help prevent construction failures caused by unfavorable soil properties.

Planners and others using soil survey information can evaluate the effect of specific land uses on productivity and on the environment in all or part of the survey area. The survey can help planners to maintain or create a land use pattern that is in harmony with nature.

Contractors can use this survey to locate sources of sand and gravel, roadfill, and topsoil. They can use it to identify areas where bedrock, wetness, or very firm soil layers can cause difficulty in excavation.

Health officials, highway officials, engineers, and others may also find this survey useful. The survey can help them plan the safe disposal of wastes and locate sites for pavements, sidewalks, campgrounds, playgrounds, lawns, and trees and shrubs.

Crops and Pasture

Thomas Burkett, agronomist, Soil Conservation Service, assisted in preparing this section.

General management needed for crops and pasture is suggested in this section. The crops or pasture plants best suited to the soils, including some not commonly grown in the survey area, are identified; the system of land capability classification used by the Soil Conservation Service is explained; and the estimated yields of the main crops and hay and pasture plants are listed for each soil.

Planners of management systems for individual fields or farms should consider the detailed information given in the description of each soil under "Detailed Soil Map Units." Specific information can be obtained from the local office of the Soil Conservation Service or the Cooperative Extension Service.

In Cleburne County, about 18,250 acres was used for harvested cropland in 1978, according to the Census of Agriculture. About 81,000 acres was used for all types of pasture. Of the total pasture, about 36,800 acres was cropland used as pasture, about 16,600 acres was other improved and unimproved pasture, and about 27,600 acres was woodland pasture.

In Van Buren County, about 16,650 acres was used for harvested cropland in 1978. About 80,300 acres was used for all types of pasture. Of the total pasture, about 37,800 acres was cropland used as pasture, about 12,000 acres was other improved and unimproved pasture, and about 30,500 acres was woodland pasture.

Most cleared land in the two counties is used for pasture and hay. The acreage of row crops is generally small. Areas of soils well suited to row crops are mainly on flood plains and terraces along the Little Red River and other streams and on a few small, nearly level to gently sloping upland areas. Crops suited to these areas are soybeans, corn, grain sorghum, and small grains. Some gently sloping to moderately sloping soils on uplands are moderately suited to drilled or sown crops, mainly oats, wheat, and grain sorghum.

Many soils in the upland area of the two counties are poorly suited or not suited to intensive use for crops because of surface stoniness, slope, shallow depth to bedrock, high content of coarse fragments, or a combination of these limitations.

Conservation tillage, contour farming, vegetated draingeways, and terraces are needed on sloping soils used for tilled crops. Annual cover crops or grasses and legumes should be grown regularly in the cropping system if the hazard of erosion is severe or very severe.

If left without vegetative protection, most of the soils tend to pack and crust over after heavy rains. Growing cover crops and managing crop residue help to maintain good tilth. Crop residue should be shredded and spread evenly to provide a protective cover and to add organic matter to the soil. Conservation tillage should be

practiced to the extent practical for the soil conditions and the crop requirement.

In general, the soils in Cleburne and Van Buren Counties are low in content of nitrogen, potassium, phosphorus, calcium, and organic matter. The kinds and amounts of fertilizer applied are generally based on soil tests, crops to be grown, past experience, capability of the soil to produce, and expected yields. On most soils, lime as indicated by soil tests helps most crops. Lime is generally necessary for satisfactory production of such crops as alfalfa, white clover, red clover, vegetables, and other specialty crops.

Perennial grasses or mixtures of grasses and legumes are grown for pasture and hay. Mixtures generally consist of either a warm-season or a cool-season perennial grass and a suitable legume.

Common and hybrid bermudagrasses are the most commonly grown warm-season perennial grasses. These warm-season plants are propagated by sprigging, or sprigging and seeding in the case of common bermudagrasses. The bermudagrass is generally sprigged because stands started by seeding are more susceptible to winter-kill. White clover is the most commonly grown legume. Tall fescue is the most commonly grown cool-season grass.

Proper grazing is essential for the production of high quality forage, stand survival, and erosion control. This helps maintain sufficient and vigorous top growth. Management includes restricted grazing of tall fescue and other cool-season grasses during the hot, dry summer. Brush control is essential, and weed control is generally needed. Rotation grazing and renovation are also important management practices.

Pasture grasses respond well to nitrogen fertilizer. Grass and legume mixtures may require phosphate, potash, and lime at rates based on soil test results.

Small acreages are in commercial and home orchards and home gardens. The acreage and cash income from these enterprises are small. Most farm families and many urban families can and freeze home grown fruit and vegetables for home use. Specialty crops, such as watermelons, strawberries, tomatoes, and sweet corn, are grown for cash sales at local farmers' markets.

Yields Per Acre

The average yields per acre that can be expected of the principal crops under a high level of management are shown in table 5. In any given year, yields may be higher or lower than those indicated in the table because of variations in rainfall and other climatic factors.

The yields are based mainly on the experience and records of farmers, conservationists, and extension agents. Available yield data from nearby counties and results of field trials and demonstrations are also considered.

The management needed to obtain the indicated yields of the various crops depends on the kind of soil and the crop. Management can include drainage, erosion control, and protection from flooding; the proper planting and seeding rates; suitable high-yielding crop varieties; appropriate and timely tillage; control of weeds, plant diseases, and harmful insects; favorable soil reaction and optimum levels of nitrogen, phosphorus, potassium, and trace elements for each crop; effective use of crop residue, barnyard manure, and green manure crops; and harvesting that insures the smallest possible loss.

The estimated yields reflect the productive capacity of each soil for each of the principal crops. Yields are likely to increase as new production technology is developed. The productivity of a given soil compared with that of other soils, however, is not likely to change.

Crops other than those shown in table 5 are grown in the survey area, but estimated yields are not listed because the acreage of such crops is small. The local office of the Soil Conservation Service or of the Cooperative Extension Service can provide information about the management and productivity of the soils for those crops.

Land Capability Classification

Land capability classification shows, in a general way, the suitability of soils for use as cropland. Crops that require special management are excluded. The soils are grouped according to their limitations for field crops, the risk of damage if they are used for crops, and the way they respond to management. The criteria used in grouping the soils do not include major, and generally expensive, landforming that would change slope, depth, or other characteristics of the soils, nor do they include possible but unlikely major reclamation projects. Capability classification is not a substitute for interpretations designed to show suitability and limitations of groups of soils for rangeland, for woodland, and for engineering purposes.

In the capability system, soils are generally grouped at three levels: capability class, subclass, and unit. Only class and subclass are used in this survey. These levels are defined in the following paragraphs.

Capability classes, the broadest groups, are designated by Roman numerals I through VIII. The numerals indicate progressively greater limitations and narrower choices for practical use. The classes are defined as follows:

Class I soils have few limitations that restrict their use.

Class II soils have moderate limitations that reduce the choice of plants or that require moderate conservation practices.

Class III soils have severe limitations that reduce the choice of plants or that require special conservation practices, or both.

Class IV soils have very severe limitations that reduce the choice of plants or that require very careful management, or both.

Class V soils are not likely to erode, but they have other limitations, impractical to remove, that limit their use.

Class VI soils have severe limitations that make them generally unsuitable for cultivation.

Class VII soils have very severe limitations that make them unsuitable for cultivation.

Class VIII soils and miscellaneous areas have limitations that nearly preclude their use for commercial crop production.

Capability subclasses are soil groups within one class. They are designated by adding a small letter, *e, w, s,* or *c,* to the class numeral, for example, IIe. The letter *e* shows that the main limitation is risk of erosion unless a close-growing plant cover is maintained; *w* shows that water in or on the soil interferes with plant growth or cultivation (in some soils the wetness can be partly corrected by artificial drainage); *s* shows that the soil is limited mainly because it is shallow, droughty, or stony; and *c*, used in only some parts of the United States, shows that the chief limitation is climate that is very cold or very dry.

There are no subclasses in class I because the soils of this class have few limitations. The soils in class V are subject to little or no erosion, but they have other limitations that restrict their use to pasture, woodland, wildlife habitat, or recreation. Class V contains only the subclasses indicated by *w, s,* or *c*.

The capability classification of each map unit is given in the section "Detailed Soil Map Units" and in Table 5.

Woodland Management and Productivity

Kelly M. Koonce, forester, Soil Conservation Service, helped prepare this section.

According to the Arkansas Forestry Commission statistics for 1981, approximately 221,600 acres, or 62 percent of the land area of Cleburne County, is forest land. Of this total, about 177,300 acres is in private ownership, about 41,300 acres is in forest industry ownership, and about 3,000 acres is in public ownership. Approximately 350,000 acres, or 77 percent of the land area of Van Buren County, is forest land. Of this total, about 280,000 acres is in private ownership, about 38,000 acres is in forest industry ownership, and about 32,000 acres is in public ownership as part of the Ozark National Forest.

Commercial forest or woodland in these two counties varies in quality. Generally, the best woodland is on deep or moderately deep soils on north-facing and east-facing slopes. Broadleaf trees dominate; however, there are scattered areas of needleleaf trees, such as shortleaf pine and eastern redcedar.

Cleburne County has 18 wood-using industries, and Van Buren County has 9. The wood-using industries are small, but they have a sizeable economic impact. Forest products produced in these counties include lumber, cross ties, pallets, fence post, handles, and fuelwood.

Both counties benefit significantly from the esthetic and recreational values of their forest land. Other benefits include wildlife habitat, grazing of domestic animals, and soil and water conservation.

Table 6 can be used by woodland owners or forest managers in planning the use of soils for wood crops. Only those soils suitable for wood crops are listed. The table lists the woodland suitability group symbol for each soil. Soils assigned the same woodland suitability group symbol require the same general management and have about the same potential productivity.

The first part of the *woodland suitability group symbol*, a number, indicates the potential productivity of the soils for important trees. The number 1 indicates very high productivity; 2, high; 3, moderately high; 4, moderate; and 5, low. The second part of the symbol, a letter, indicates the major kind of soil limitation. The letter *x* indicates stoniness or rockiness; *w*, excessive water in or on the soil; *d*, restricted root depth; *s*, sandy texture; *f*, high content of coarse fragments in the soil profile; and *r*, steep slopes. The letter *o* indicates that limitations or restrictions are insignificant. If a soil has more than one limitation, the priority is as follows: x, w, d, s, f, and r.

The third element in the symbol, a numeral, indicates the kinds of trees for which the soils in the group are best suited and also indicates the severity of the hazard or limitation. The numerals 1, 2, and 3 indicate slight, moderate, and severe limitations, respectively, and suitability for needleleaf trees. The numerals 4, 5, and 6 indicate slight, moderate, and severe limitations, respectively, and suitability for broadleaved trees. The numerals 7, 8, and 9 indicate slight, moderate, and severe limitations, respectively, and suitability for both needleleaf and broadleaved trees.

In table 6, *slight, moderate,* and *severe* indicate the degree of the major soil limitations to be considered in management.

Ratings of the *erosion hazard* indicate the risk of loss of soil in a well-managed woodland. The risk is *slight* if the expected soil loss is small, *moderate* if measures are needed to control erosion during logging and road construction, and *severe* if intensive management or special equipment and methods are needed to prevent excessive loss of soil.

Ratings of *equipment limitation* reflect the characteristics and conditions of the soil that restrict use of the equipment generally needed in woodland management or harvesting. A rating of *slight* indicates that use of equipment is not limited to a particular kind of equipment or time of year; *moderate* indicates a short seasonal limitation or a need for some modification in management or in equipment; and *severe* indicates a seasonal limitation, a need for special equipment or management, or a hazard in the use of equipment.

Seedling mortality ratings indicate the degree to which the soil affects the mortality of tree seedlings. Plant competition is not considered in the ratings. The ratings apply to seedlings from good stock that are properly planted during a period of sufficient rainfall. A rating of *slight* indicates that the expected mortality is less than 25 percent; *moderate*, 25 to 50 percent; and *severe*, more than 50 percent.

The *potential productivity* of merchantable or *common trees* on a soil is expressed as a *site index*. This index is the average height, in feet, that dominant and codominant trees of a given species attain in a specified number of years. The site index applies to fully stocked, even-aged, unmanaged stands. Commonly grown trees are those that woodland managers generally favor in intermediate or improvement cuttings. They are selected on the basis of growth rate, quality, value, and marketability.

Trees to plant are those that are suited to the soils and to commercial wood production.

Recreation

In table 7, the soils of the survey area are rated according to the limitations that affect their suitability for recreation. The ratings are based on restrictive soil features, such as wetness, slope, and texture of the surface layer. Susceptibility to flooding is considered. Not considered in the ratings, but important in evaluating a site, are the location and accessibility of the area, the size and shape of the area and its scenic quality, vegetation, access to water, potential water impoundment sites, and access to public sewerlines. The capacity of the soil to absorb septic tank effluent and the ability of the soil to support vegetation are also important. Soils subject to flooding are limited for recreational use by the duration and intensity of flooding and the season when flooding occurs. In planning recreation facilities, onsite assessment of the height, duration, intensity, and frequency of flooding is essential.

In table 7, the degree of soil limitation is expressed as slight, moderate, or severe. *Slight* means that soil properties are generally favorable and that limitations are minor and easily overcome. *Moderate* means that limitations can be overcome or alleviated by planning, design, or special maintenance. *Severe* means that soil properties are unfavorable and that limitations can be offset only by costly soil reclamation, special design, intensive maintenance, limited use, or by a combination of these measures.

The information in table 7 can be supplemented by other information in this survey, for example, interpretations for septic tank absorption fields in table 10 and interpretations for dwellings without basements and for local roads and streets in table 9.

Camp areas require site preparation such as shaping and leveling the tent and parking areas, stabilizing roads and intensively used areas, and installing sanitary facilities and utility lines. Camp areas are subject to heavy foot traffic and some vehicular traffic. The best soils have gentle slopes and are not wet or subject to flooding during the period of use. The surface has few or no stones or boulders, absorbs rainfall readily but remains firm, and is not dusty when dry. Strong slopes and stones or boulders can greatly increase the cost of constructing campsites.

Picnic areas are subject to heavy foot traffic. Most vehicular traffic is confined to access roads and parking areas. The best soils for picnic areas are firm when wet, are not dusty when dry, are not subject to flooding during the period of use, and do not have slopes, stones, or boulders that increase the cost of shaping sites or of building access roads and parking areas.

Playgrounds require soils that can withstand intensive foot traffic. The best soils are almost level and are not wet or subject to flooding during the season of use. The surface is free of stones and boulders, is firm after rains, and is not dusty when dry. If grading is needed, the depth of the soil over bedrock or a hardpan should be considered.

Paths and trails for hiking and horseback riding should require little or no cutting and filling. The best soils are not wet, are firm after rains, are not dusty when dry, and are not subject to flooding more than once a year during the period of use. They have moderate slopes and few or no stones or boulders on the surface.

Wildlife Habitat

Paul Brady, biologist, Soil Conservation Service, helped prepare this section.

Cleburne and Van Buren Counties are predominantly woodland and pastoral environments with pleasant scenery and abundant wildlife habitat.

About 70 percent (571,600 acres) of this two-county area is forested, including about 32,000 acres of the Ozark National Forest in Van Buren County. Roughly, 80 percent of these forests are hardwoods (oak-hickory climax on uplands, oak-gum climax on lowlands) and about 20 percent are shortleaf pine and redcedar.

About 20 percent of the area, or 161,300 acres, is grassland: mainly improved pasture with tall fescue, common and hybrid bermudagrass, orchardgrass, annual lespedeza, and red clover. An estimated 18,000 to 20,000 acres of these grasslands are native pastures with big bluestem, little bluestem, broomsedge, indiangrass, and other native grasses and forbes.

Major plants grown on approximately 34,900 acres of cropland are soybeans, wheat, and grain sorghum, all mainly located in the southern part of each county.

Plants of major importance to wildlife in these counties include: wooly croton, annual lespedeza, panicgrasses, paspalums, ragweed, tickclover, wheat, soybean, grain sorghum, vetch, oak, hickory, hackberry, shortleaf pine,

redcedar, elderberry, grape, dogwood, blackberry, greenbrier, honeysuckle, persimmon, sumacs, and wild cherry.

The abundant forests, interspersed pastures, croplands, fence rows, and numerous edges provide much food and cover for white-tailed deer, black bear, squirrels, bobwhite quail, raccoons, coyotes, opossums, foxes, wild turkeys, rabbits, owls, hawks, numerous nongame birds, small mammals, reptiles, and other wildlife. Wild turkey and black bear populations appear to be increasing, especially in Van Buren County.

The Gulf Mountain Wildlife Management Area, owned and managed by the Arkansas Game and Fish Commission, provides habitat and public hunting for deer, quail, squirrel, rabbit, wild turkey, and other wildlife on 10,112 acres in western Van Buren County.

Lowland habitats along streams, lakes, and ponds in the area support a variety of furbearing animals, including beaver, mink, raccoon, gray fox, striped skunk, and coyote.

Aquatic habitats are abundant, interesting, and important to the economy of certain parts of the area. Cleburne County contains about 2,330 ponds, 127 miles of fishable streams, and about 24,000 acres of Greers Ferry Lake, a United States Army Corps of Engineers impoundment on the Little Red River. Van Buren County includes about 3,000 ponds, 143 miles of fishable streams, and the remaining 7,500 acres of Greers Ferry Lake.

Major streams in the two counties are the Little Red River, including Archey's Fork, Middle Fork, South Fork, Devil's Fork, and West Fork, and the North Fork of Cadron Creek.

The cool water of the Little Red River, all of its forks, and Greers Ferry Lake provide very good and economically important sport fisheries to the area. All parts of the Little Red River upstream from the lake in Van Buren County are habitat for the smallmouth bass. The cold-water release from the dam on Greers Ferry Lake maintains about 30 miles of good trout habitat downstream in the Little Red River in Cleburne County. Periodic trout stockings, primarily rainbow trout, from state and federal fish hatcheries maintain excellent and very popular trout fishing in this part of the Little Red River.

Important sport fish in these counties include rainbow trout, brown trout, hybrid striped bass, largemouth bass, spotted bass, smallmouth bass, rock bass, white bass, crappies, blue catfish, channel catfish, flathead catfish, bluegill, redear sunfish, longear sunfish, and green sunfish.

Soils affect the kind and amount of vegetation that is available to wildlife as food and cover. They also affect the construction of water impoundments. The kind and abundance of wildlife depend largely on the amount and distribution of food, cover, and water. Wildlife habitat can be created or improved by planting appropriate vegetation, by maintaining the existing plant cover, or by promoting the natural establishment of desirable plants.

In table 8, the soils in the survey area are rated according to their potential for providing habitat for various kinds of wildlife. This information can be used in planning parks, wildlife refuges, nature study areas, and other developments for wildlife; in selecting soils that are suitable for establishing, improving, or maintaining specific elements of wildlife habitat; and in determining the intensity of management needed for each element of the habitat.

The potential of the soil is rated good, fair, poor, or very poor. A rating of *good* indicates that the element or kind of habitat is easily established, improved, or maintained. Few or no limitations affect management, and satisfactory results can be expected. A rating of *fair* indicates that the element or kind of habitat can be established, improved, or maintained in most places. Moderately intensive management is required for satisfactory results. A rating of *poor* indicates that limitations are severe for the designated element or kind of habitat. Habitat can be created, improved, or maintained in most places, but management is difficult and must be intensive. A rating of *very poor* indicates that restrictions for the element or kind of habitat are very severe and that unsatisfactory results can be expected. Creating, improving, or maintaining habitat is impractical or impossible.

The elements of wildlife habitat are described in the following paragraphs.

Grain and seed crops are domestic grains and seed-producing herbaceous plants. Soil properties and features that affect the growth of grain and seed crops are depth of the root zone, texture of the surface layer, available water capacity, wetness, slope, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of grain and seed crops are corn, wheat, oats, and rye.

Grasses and legumes are domestic perennial grasses and herbaceous legumes. Soil properties and features that affect the growth of grasses and legumes are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, flood hazard, and slope. Soil temperature and soil moisture are also considerations. Examples of grasses and legumes are fescue, lovegrass, bromegrass, clover, and vetch.

Wild herbaceous plants are native or naturally established grasses and forbs, including weeds. Soil properties and features that affect the growth of these plants are depth of the root zone, texture of the surface layer, available water capacity, wetness, surface stoniness, and flood hazard. Soil temperature and soil moisture are also considerations. Examples of wild herbaceous plants are bluestem, goldenrod, beggarweed, wheatgrass, and panicgrasses.

Hardwood trees and woody understory produce nuts or other fruit, buds, catkins, twigs, bark, and foliage. Soil

properties and features that affect the growth of hardwood trees and shrubs are depth of the root zone, the available water capacity, and wetness. Examples of these plants are oak, poplar, cherry, sweetgum, apple, hawthorn, dogwood, hickory, blackberry, and blueberry. Examples of fruit-producing shrubs that are suitable for planting on soils rated *good* are Russian-olive, autumn-olive, and crabapple.

Coniferous plants furnish browse and seeds. Soil properties and features that affect the growth of coniferous trees, shrubs, and ground cover are depth of the root zone, available water capacity, and wetness. Examples of coniferous plants are pine, spruce, fir, cedar, and juniper.

Wetland plants are annual and perennial, wild herbaceous plants that grow on moist or wet sites. Submerged or floating aquatic plants are excluded. Soil properties and features affecting wetland plants are texture of the surface layer, wetness, reaction, salinity, slope, and surface stoniness. Examples of wetland plants are smartweed, wild millet, beak-rushes, spikerush, rushes, sedges, and reeds.

Shallow water areas have an average depth of less than 5 feet. Some are naturally wet areas. Others are created by dams, levees, or other water-control structures. Soil properties and features affecting shallow water areas are depth to bedrock, wetness, surface stoniness, slope, and permeability. Examples of shallow water areas are marshes, waterfowl feeding areas, and ponds.

The habitat for various kinds of wildlife is described in the following paragraphs.

Habitat for openland wildlife consists of cropland, pasture, meadows, and areas that are overgrown with grasses, herbs, shrubs, and vines. These areas produce grain and seed crops, grasses and legumes, and wild herbaceous plants. The wildlife attracted to these areas include bobwhite quail, meadowlark, field sparrow, cottontail, and red fox.

Habitat for woodland wildlife consists of areas of deciduous plants or coniferous plants or both and associated grasses, legumes, and wild herbaceous plants. Wildlife attracted to these areas include wild turkey, woodcock, thrushes, woodpeckers, squirrels, gray fox, raccoon, deer, and bear.

Habitat for wetland wildlife consists of open, marshy or swampy shallow water areas. Some of the wildlife attracted to such areas are ducks, geese, herons, muskrat, mink, and beaver.

Engineering

This section provides information for planning land uses related to urban development and to water management. Soils are rated for various uses, and the most limiting features are identified. The ratings are given in the following tables: Building site development, Sanitary facilities, Construction materials, and Water management. The ratings are based on observed performance of the soils and on the estimated data and test data in the "Soil Properties" section.

Information in this section is intended for land use planning, for evaluating land use alternatives, and for planning site investigations prior to design and construction. The information, however, has limitations. For example, estimates and other data generally apply only to that part of the soil within a depth of 5 or 6 feet. Because of the map scale, small areas of different soils may be included within the mapped areas of a specific soil.

The information is not site specific and does not eliminate the need for onsite investigation of the soils or for testing and analysis by personnel experienced in the design and construction of engineering works.

Government ordinances and regulations that restrict certain land uses or impose specific design criteria were not considered in preparing the information in this section. Local ordinances and regulations must be considered in planning, in site selection, and in design.

Soil properties, site features, and observed performance were considered in determining the ratings in this section. During the fieldwork for this soil survey, determinations were made about grain-size distribution, liquid limit, plasticity index, soil reaction, depth to bedrock, hardness of bedrock within 5 to 6 feet of the surface, soil wetness, depth to a seasonal high water table, slope, likelihood of flooding, natural soil structure aggregation, and soil density. Data were collected about kinds of clay minerals, mineralogy of the sand and silt fractions, and the kind of adsorbed cations. Estimates were made for erodibility, permeability, corrosivity, shrink-swell potential, available water capacity, and other behavioral characteristics affecting engineering uses.

This information can be used to: evaluate the potential of areas for residential, commercial, industrial, and recreational uses; make preliminary estimates of construction conditions; evaluate alternative routes for roads, streets, highways, pipelines, and underground cables; evaluate alternative sites for sanitary landfills, septic tank absorption fields, and sewage lagoons; plan detailed onsite investigations of soils and geology; locate potential sources of gravel, sand, earthfill, and topsoil; plan drainage systems, irrigation systems, ponds, terraces, and other structures for soil and water conservation; and predict performance of proposed small structures and pavements by comparing the performance of existing similar structures on the same or similar soils.

The information in the tables, along with the soil maps, the soil descriptions, and other data provided in this survey can be used to make additional interpretations.

Some of the terms used in this soil survey have a special meaning in soil science and are defined in the Glossary.

Building Site Development

Table 9 shows the degree and kind of soil limitations that affect shallow excavations, dwellings with and without basements, small commercial buildings, local roads and streets, and lawns and landscaping. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required. Special feasibility studies may be required where the soil limitations are severe.

Shallow excavations are trenches or holes dug to a maximum depth of 5 or 6 feet for basements, graves, utility lines, open ditches, and other purposes. The ratings are based on soil properties, site features, and observed performance of the soils. The ease of digging, filling, and compacting is affected by the depth to bedrock, a cemented pan, or a very firm dense layer; stone content; soil texture; and slope. The time of the year that excavations can be made is affected by the depth to a seasonal high water table and the susceptibility of the soil to flooding. The resistance of the excavation walls or banks to sloughing or caving is affected by soil texture and the depth to the water table.

Dwellings and small commercial buildings are structures built on shallow foundations on undisturbed soil. The load limit is the same as that for single-family dwellings no higher than three stories. Ratings are made for small commercial buildings without basements, for dwellings with basements, and for dwellings without basements. The ratings are based on soil properties, site features, and observed performance of the soils. A high water table, flooding, shrink-swell potential, and organic layers can cause the movement of footings. A high water table, depth to bedrock or to a cemented pan, large stones, and flooding affect the ease of excavation and construction. Landscaping and grading that require cuts and fills of more than 5 to 6 feet are not considered.

Local roads and streets have an all-weather surface and carry automobile and light truck traffic all year. They have a subgrade of cut or fill soil material, a base of gravel, crushed rock, or stabilized soil material, and a flexible or rigid surface. Cuts and fills are generally limited to less than 6 feet. The ratings are based on soil properties, site features, and observed performance of the soils. Depth to bedrock or to a cemented pan, a high water table, flooding, large stones, and slope affect the ease of excavating and grading. Soil strength (as inferred from the engineering classification of the soil), shrink-swell potential, frost-action potential, and depth to a high water table affect the traffic-supporting capacity.

Sanitary Facilities

Table 10 shows the degree and the kind of soil limitations that affect septic tank absorption fields, sewage lagoons, and sanitary landfills. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increases in construction costs, and possibly increased maintenance are required.

Table 10 also shows the suitability of the soils for use as daily cover for landfills. A rating of *good* indicates that soil properties and site features are favorable for the use and that good performance and low maintenance can be expected; *fair* indicates that soil properties and site features are moderately favorable for the use and one or more soil properties or site features make the soil less desirable than the soils rated good; and *poor* indicates that one or more soil properties or site features are unfavorable for the use and overcoming the unfavorable properties requires special design, extra maintenance, or costly alteration.

Septic tank absorption fields are areas in which effluent from a septic tank is distributed into the soil through subsurface tiles or perforated pipe. Only that part of the soil between depths of 24 and 60 inches is evaluated. The ratings are based on soil properties, site features, and observed performance of the soils. Permeability, a high water table, depth to bedrock or to a cemented pan, and flooding affect absorption of the effluent. Large stones and bedrock or a cemented pan interfere with installation.

Unsatisfactory performance of septic tank absorption fields, including excessively slow absorption of effluent, surfacing of effluent, and hillside seepage, can affect public health. Ground water can be polluted if highly permeable sand and gravel or fractured bedrock is less than 4 feet below the base of the absorption field, if slope is excessive, or if the water table is near the surface. There must be unsaturated soil material beneath the absorption field to filter the effluent effectively. Many local ordinances require that this material be of a certain thickness.

Sewage lagoons are shallow ponds constructed to hold sewage while aerobic bacteria decompose the solid and liquid wastes. Lagoons should have a nearly level floor surrounded by cut slopes or embankments of compacted soil. Lagoons generally are designed to hold the sewage within a depth of 2 to 5 feet. Nearly impervious soil material for the lagoon floor and sides is required to minimize seepage and contamination of ground water.

Table 10 gives ratings for the natural soil that makes up the lagoon floor. The surface layer and, generally, 1 or 2 feet of soil material below the surface layer are excavated to provide material for the embankments. The ratings are based on soil properties, site features, and observed performance of the soils. Considered in the ratings are slope, permeability, a high water table, depth to bedrock or to a cemented pan, flooding, large stones, and content of organic matter.

Excessive seepage due to rapid permeability of the soil or a water table that is high enough to raise the level of sewage in the lagoon causes a lagoon to function unsatisfactorily. Pollution results if seepage is excessive or if floodwater overtops the lagoon. A high content of organic matter is detrimental to proper functioning of the lagoon because it inhibits aerobic activity. Slope, bedrock, and cemented pans can cause construction problems, and large stones can hinder compaction of the lagoon floor.

Sanitary landfills are areas where solid waste is disposed of by burying it in soil. There are two types of landfill—trench and area. In a trench landfill, the waste is placed in a trench. It is spread, compacted, and covered daily with a thin layer of soil excavated at the site. In an area landfill, the waste is placed in successive layers on the surface of the soil. The waste is spread, compacted, and covered daily with a thin layer of soil from a source away from the site.

Both types of landfill must be able to bear heavy vehicular traffic. Both types involve a risk of ground water pollution. Ease of excavation and revegetation needs to be considered.

The ratings in table 10 are based on soil properties, site features, and observed performance of the soils. Permeability, depth to bedrock or to a cemented pan, a high water table, slope, and flooding affect both types of landfill. Texture, stones and boulders, highly organic layers, soil reaction, and content of salts and sodium affect trench type landfills. Unless otherwise stated, the ratings apply only to that part of the soil within a depth of about 6 feet. For deeper trenches, a limitation rated slight or moderate may not be valid. Onsite investigation is needed.

Daily cover for landfill is the soil material that is used to cover compacted solid waste in an area type sanitary landfill. The soil material is obtained offsite, transported to the landfill, and spread over the waste.

Soil texture, wetness, coarse fragments, and slope affect the ease of removing and spreading the material during wet and dry periods. Loamy or silty soils that are free of large stones or excess gravel are the best cover for a landfill. Clayey soils are sticky or cloddy and are difficult to spread; sandy soils are subject to soil blowing.

After soil material has been removed, the soil material remaining in the borrow area must be thick enough over bedrock, a cemented pan, or the water table to permit revegetation. The soil material used as final cover for a landfill should be suitable for plants. The surface layer generally has the best workability, more organic matter, and the best potential for plants. Material from the surface layer should be stockpiled for use as the final cover.

Construction Materials

Table 11 gives information about the soils as a source of roadfill, sand, gravel, and topsoil. The soils are rated *good, fair,* or *poor* as a source of roadfill and topsoil. They are rated as a probable or improbable source of sand and gravel. The ratings are based on soil properties and site features that affect the removal of the soil and its use as construction material. Normal compaction, minor processing, and other standard construction practices are assumed. Each soil is evaluated to a depth of 5 or 6 feet.

Roadfill is soil material that is excavated in one place and used in road embankments in another place. In this table, the soils are rated as a source of roadfill for low embankments, generally less than 6 feet high and less exacting in design than higher embankments.

The ratings are for the soil material below the surface layer to a depth of 5 or 6 feet. It is assumed that soil layers will be mixed during excavating and spreading. Many soils have layers of contrasting suitability within their profile. The table showing engineering index properties provides detailed information about each soil layer. This information can help determine the suitability of each layer for use as roadfill. The performance of soil after it is stabilized with lime or cement is not considered in the ratings.

The ratings are based on soil properties, site features, and observed performance of the soils. The thickness of suitable material is a major consideration. The ease of excavation is affected by large stones, a high water table, and slope. How well the soil performs in place after it has been compacted and drained is determined by its strength (as inferred from the engineering classification of the soil) and shrink-swell potential.

Soils rated *good* contain significant amounts of sand or gravel or both. They have at least 5 feet of suitable material, low shrink-swell potential, few cobbles and stones, and slopes of 15 percent or less. Depth to the water table is more than 3 feet. Soils rated *fair* are more than 35 percent silt- and clay-sized particles and have a plasticity index of less than 10. They have moderate shrink-swell potential, slopes of 15 to 25 percent, or many stones. Depth to the water table is 1 to 3 feet. Soils rated *poor* have a plasticity index of more than 10, a high shrink-swell potential, many stones, or slopes of more than 25 percent. They are wet, and the depth to the water table is less than 1 foot. They may have layers of suitable material, but the material is less than 3 feet thick.

Sand and gravel are natural aggregates suitable for commercial use with a minimum of processing. Sand and gravel are used in many kinds of construction. Specifications for each use vary widely. In table 11, only the probability of finding material in suitable quantity is evaluated. The suitability of the material for specific purposes is not evaluated, nor are factors that affect excavation of the material.

The properties used to evaluate the soil as a source of sand or gravel are gradation of grain sizes (as indicated by the engineering classification of the soil), the thickness of suitable material, and the content of rock fragments. Kinds of rock, acidity, and stratification are given in the soil series descriptions. Gradation of grain sizes is given in the table on engineering index properties.

A soil rated as a probable source has a layer of clean sand or gravel or a layer of sand or gravel that is up to 12 percent silty fines. This material must be at least 3 feet thick and less than 50 percent, by weight, large stones. All other soils are rated as an improbable source. Coarse fragments of soft bedrock, such as shale and siltstone, are not considered to be sand and gravel.

Topsoil is used to cover an area so that vegetation can be established and maintained. The upper 40 inches of a soil is evaluated for use as topsoil. Also evaluated is the reclamation potential of the borrow area.

Plant growth is affected by toxic material and by such properties as soil reaction, available water capacity, and fertility. The ease of excavating, loading, and spreading is affected by rock fragments, slope, a water table, soil texture, and thickness of suitable material. Reclamation of the borrow area is affected by slope, a water table, rock fragments, bedrock, and toxic material.

Soils rated *good* have friable, loamy material to a depth of at least 40 inches. They are free of stones and cobbles, have little or no gravel, and have slopes of less than 8 percent. They are low in content of soluble salts, are naturally fertile or respond well to fertilizer, and are not so wet that excavation is difficult.

Soils rated *fair* are sandy soils, loamy soils that have a relatively high content of clay, soils that have only 20 to 40 inches of suitable material, soils that have an appreciable amount of gravel, stones, or soluble salts, or soils that have slopes of 8 to 15 percent. The soils are not so wet that excavation is difficult.

Soils rated *poor* are very sandy or clayey, have less than 20 inches of suitable material, have a large amount of gravel, stones, or soluble salts, have slopes of more than 15 percent, or have a seasonal water table at or near the surface.

The surface layer of most soils is generally preferred for topsoil because of its organic matter content. Organic matter greatly increases the absorption and retention of moisture and nutrients for plant growth.

Water Management

Table 12 gives information on the soil properties and site features that affect water management. The degree and kind of soil limitations are given for pond reservoir areas and embankments, dikes, and levees. The limitations are considered *slight* if soil properties and site features are generally favorable for the indicated use and limitations are minor and are easily overcome; *moderate* if soil properties or site features are not favorable for the indicated use and special planning, design, or maintenance is needed to overcome or minimize the limitations; and *severe* if soil properties or site features are so unfavorable or so difficult to overcome that special design, significant increase in construction costs, and possibly increased maintenance are required.

This table also gives the restrictive features that affect each soil for drainage, irrigation, terraces and diversions, and grassed waterways.

Pond reservoir areas hold water behind a dam or embankment. Soils best suited to this use have low seepage potential in the upper 60 inches. The seepage potential is determined by the permeability of the soil and the depth to fractured bedrock or other permeable material. Excessive slope can affect the storage capacity of the reservoir area.

Embankments, dikes, and levees are raised structures of soil material, generally less than 20 feet high, constructed to impound water or to protect land against overflow. In this table, the soils are rated as a source of material for embankment fill. The ratings apply to the soil material below the surface layer to a depth of about 5 feet. It is assumed that soil layers will be uniformly mixed and compacted during construction.

The ratings do not indicate the ability of the natural soil to support an embankment. Soil properties to a depth greater than the height of the embankment can affect performance and safety of the embankment. Generally, deeper onsite investigation is needed to determine these properties.

Soil material in embankments must be resistant to seepage, piping, and erosion and have favorable compaction characteristics. Unfavorable features include less than 5 feet of suitable material and a high content of stones or boulders, organic matter, or salts or sodium. A high water table affects the amount of usable material. It also affects trafficability.

Drainage is the removal of excess surface and subsurface water from the soil. How easily and effectively the soil is drained depends on the depth to bedrock, to a cemented pan, or to other layers that affect the rate of water movement; permeability; depth to a high water table or depth of standing water if the soil is subject to ponding; slope; susceptibility to flooding; subsidence of organic layers; and potential frost action. Excavating and grading and the stability of ditchbanks

are affected by depth to bedrock or to a cemented pan, large stones, slope, and the hazard of cutbanks caving. The productivity of the soil after drainage is adversely affected by extreme acidity or by toxic substances in the root zone, such as salts, sodium, or sulfur. Availability of drainage outlets is not considered in the ratings.

Irrigation is the controlled application of water to supplement rainfall and support plant growth. The design and management of an irrigation system are affected by depth to the water table, the need for drainage, flooding, available water capacity, intake rate, permeability, erosion hazard, and slope. The construction of a system is affected by large stones and depth to bedrock or to a cemented pan. The performance of a system is affected by the depth of the root zone, the amount of salts or sodium, and soil reaction.

Terraces and diversions are embankments or a combination of channels and ridges constructed across a slope to reduce erosion and conserve moisture by intercepting runoff. Slope, wetness, large stones, and depth to bedrock or to a cemented pan affect the construction of terraces and diversions. A restricted rooting depth, a severe hazard of wind or water erosion, an excessively coarse texture, and restricted permeability adversely affect maintenance.

Grassed waterways are natural or constructed channels, generally broad and shallow, that conduct surface water to outlets at a nonerosive velocity. Large stones, wetness, slope, and depth to bedrock or to a cemented pan affect the construction of grassed waterways. A hazard of wind erosion, low available water capacity, restricted rooting depth, toxic substances such as salts or sodium, and restricted permeability adversely affect the growth and maintenance of the grass after construction.

Soil Properties

Data relating to soil properties are collected during the course of the soil survey. The data and the estimates of soil and water features, listed in tables, are explained on the following pages.

Soil properties are determined by field examination of the soils and by laboratory index testing of some benchmark soils. Established standard procedures are followed. During the survey, many shallow borings are made and examined to identify and classify the soils and to delineate them on the soil maps. Samples are taken from some typical profiles and tested in the laboratory to determine grain-size distribution, plasticity, and compaction characteristics.

Estimates of soil properties are based on field examinations, on laboratory tests of samples from the survey area, and on laboratory tests of samples of similar soils in nearby areas. Tests verify field observations, verify properties that cannot be estimated accurately by field observation, and help characterize key soils.

The estimates of soil properties shown in the tables include the range of grain-size distribution and Atterberg limits, the engineering classifications, and the physical and chemical properties of the major layers of each soil. Pertinent soil and water features also are given.

Engineering Index Properties

Table 13 gives estimates of the engineering classification and of the range of index properties for the major layers of each soil in the survey area. Most soils have layers of contrasting properties within the upper 5 or 6 feet.

Depth to the upper and lower boundaries of each layer is indicated. The range in depth and information on other properties of each layer are given for each soil series under "Soil Series and Their Morphology."

Texture is given in the standard terms used by the U.S. Department of Agriculture *(4)*. These terms are defined according to percentages of sand, silt, and clay in the fraction of the soil that is less than 2 millimeters in diameter. "Loam," for example, is soil that is 7 to 27 percent clay, 28 to 50 percent silt, and less than 52 percent sand. If the content of particles coarser than sand is as much as 15 percent, an appropriate modifier is added, for example, "gravelly." Textural terms are defined in the Glossary.

Classification of the soils is determined according to the Unified soil classification system *(2)* and the system adopted by the American Association of State Highway and Transportation Officials *(1)*.

The Unified system classifies soils according to properties that affect their use as construction material. Soils are classified according to grain-size distribution of the fraction less than 3 inches in diameter and according to plasticity index, liquid limit, and organic matter content. Sandy and gravelly soils are identified as GW, GP, GM, GC, SW, SP, SM, and SC; silty and clayey soils as ML, CL, OL, MH, CH, and OH; and highly organic soils as PT. Soils exhibiting engineering properties of two groups can have a dual classification, for example, SP-SM.

The AASHTO system classifies soils according to those properties that affect roadway construction and maintenance. In this system, the fraction of a mineral soil that is less than 3 inches in diameter is classified in one of seven groups from A-1 through A-7 on the basis of grain-size distribution, liquid limit, and plasticity index. Soils in group A-1 are coarse grained and low in content of fines (silt and clay). At the other extreme, soils in group A-7 are fine grained. Highly organic soils are classified in group A-8 on the basis of visual inspection.

If laboratory data are available, the A-1, A-2, and A-7 groups are further classified as A-1-a, A-1-b, A-2-4, A-2-5, A-2-6, A-2-7, A-7-5, or A-7-6. As an additional refinement, the suitability of a soil as subgrade material can be indicated by a group index number. Group index numbers range from 0 for the best subgrade material to 20, or higher, for the poorest.

Rock fragments larger than 3 inches in diameter are indicated as a percentage of the total soil on a dry-weight basis. The percentages are estimates determined mainly by converting volume percentage in the field to weight percentage.

Percentage (of soil particles) passing designated sieves is the percentage of the soil fraction less than 3 inches in diameter based on an ovendry weight. The sieves, numbers 4, 10, 40, and 200 (USA Standard Series), have openings of 4.76, 2.00, 0.420, and 0.074 millimeters, respectively. Estimates are based on laboratory tests of soils sampled in the survey area and in nearby areas and on estimates made in the field.

Liquid limit and *plasticity index* (Atterberg limits) indicate the plasticity characteristics of a soil. The

estimates are based on test data from the survey area, or from nearby areas, and on field examination.

Physical and Chemical Properties

Table 14 shows estimates of some characteristics and features that affect soil behavior. These estimates are given for the major layers of each soil in the survey area. The estimates are based on field observations and on test data for these and similar soils.

Clay as a soil separate, or component, consists of mineral soil particles that are less than 0.002 millimeter in diameter. In this table, the estimated clay content of each major soil layer is given as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The amount and kind of clay greatly affect the fertility and physical condition of the soil. They determine the ability of the soil to adsorb cations and to retain moisture. They influence shrink-swell potential, permeability, plasticity, the ease of soil dispersion, and other soil properties. The amount and kind of clay in a soil also affect tillage and earthmoving operations.

Moist bulk density is the weight of soil (ovendry) per unit volume. Volume is measured when the soil is at field moisture capacity, that is, the moisture content at 1/3 bar moisture tension. Weight is determined after drying the soil at 105 degrees C. In this table, the estimated moist bulk density of each major soil horizon is expressed in grams per cubic centimeter of soil material that is less than 2 millimeters in diameter. Bulk density data are used to compute shrink-swell potential, available water capacity, total pore space, and other soil properties. The moist bulk density of a soil indicates the pore space available for water and roots. A bulk density of more than 1.6 can restrict water storage and root penetration. Moist bulk density is influenced by texture, kind of clay, content of organic matter, and soil structure.

Permeability refers to the ability of a soil to transmit water or air. The estimates indicate the rate of downward movement of water when the soil is saturated. They are based on soil characteristics observed in the field, particularly structure, porosity, and texture. Permeability is considered in the design of soil drainage systems, septic tank absorption fields, and construction where the rate of water movement under saturated conditions affects behavior.

Available water capacity refers to the quantity of water that the soil is capable of storing for use by plants. The capacity for water storage in each major soil layer is stated in inches of water per inch of soil. The capacity varies, depending on soil properties that affect the retention of water and the depth of the root zone. The most important properties are the content of organic matter, soil texture, bulk density, and soil structure. Available water capacity is an important factor in the choice of plants or crops to be grown and in the design and management of irrigation systems. Available water capacity is not an estimate of the quantity of water actually available to plants at any given time.

Soil reaction is a measure of acidity or alkalinity and is expressed as a range in pH values. The range in pH of each major horizon is based on many field tests. For many soils, values have been verified by laboratory analyses. Soil reaction is important in selecting crops and other plants, in evaluating soil amendments for fertility and stabilization, and in determining the risk of corrosion.

Shrink-swell potential is the potential for volume change in a soil with a loss or gain in moisture. Volume change occurs mainly because of the interaction of clay minerals with water and varies with the amount and type of clay minerals in the soil. The size of the load on the soil and the magnitude of the change in soil moisture content influence the amount of swelling of soils in place. Laboratory measurements of swelling of undisturbed clods were made for many soils. For others, swelling was estimated on the basis of the kind and amount of clay minerals in the soil and on measurements of similar soils.

If the shrink-swell potential is rated moderate to very high, shrinking and swelling can cause damage to buildings, roads, and other structures. Special design is often needed.

Shrink-swell potential classes are based on the change in length of an unconfined clod as moisture content is increased from air-dry to field capacity. The change is based on the soil fraction less than 2 millimeters in diameter. The classes are *low*, a change of less than 3 percent; *moderate*, 3 to 6 percent; and *high*, more than 6 percent. *Very high*, greater than 9 percent, is sometimes used.

Erosion factor K indicates the susceptibility of a soil to sheet and rill erosion by water. Factor K is one of six factors used in the Universal Soil Loss Equation (USLE) to predict the average annual rate of soil loss by sheet and rill erosion. Losses are expressed in tons per acre per year. These estimates are based primarily on percentage of silt, sand, and organic matter (up to 4 percent) and on soil structure and permeability. Values of K range from 0.02 to 0.69. The higher the value, the more susceptible the soil is to sheet and rill erosion by water.

Erosion factor T is an estimate of the maximum average annual rate of soil erosion by wind or water that can occur over a sustained period without affecting crop productivity. The rate is expressed in tons per acre per year.

Organic matter is the plant and animal residue in the soil at various stages of decomposition.

In table 14, the estimated content of organic matter is expressed as a percentage, by weight, of the soil material that is less than 2 millimeters in diameter.

The content of organic matter of a soil can be maintained or increased by returning crop residue to the soil. Organic matter affects the available water capacity, infiltration rate, and tilth. It is a source of nitrogen and other nutrients for crops.

Soil and Water Features

Table 15 gives estimates of various soil and water features. The estimates are used in land use planning that involves engineering considerations.

Hydrologic soil groups are used to estimate runoff from precipitation. Soils are assigned to one of four groups. They are grouped according to the intake of water when the soils are thoroughly wet and receive precipitation from long-duration storms.

The four hydrologic soil groups are:

Group A. Soils having a high infiltration rate (low runoff potential) when thoroughly wet. These consist mainly of deep, well drained to excessively drained sands or gravelly sands. These soils have a high rate of water transmission.

Group B. Soils having a moderate infiltration rate when thoroughly wet. These consist chiefly of moderately deep or deep, moderately well drained or well drained soils that have moderately fine texture to moderately coarse texture. These soils have a moderate rate of water transmission.

Group C. Soils having a slow infiltration rate when thoroughly wet. These consist chiefly of soils having a layer that impedes the downward movement of water or soils of moderately fine texture or fine texture. These soils have a slow rate of water transmission.

Group D. Soils having a very slow infiltration rate (high runoff potential) when thoroughly wet. These consist chiefly of clays that have high shrink-swell potential, soils that have a permanent high water table, soils that have a claypan or clay layer at or near the surface, and soils that are shallow over nearly impervious material. These soils have a very slow rate of water transmission.

Flooding, the temporary inundation of an area, is caused by overflowing streams, by runoff from adjacent slopes, or by tides. Water standing for short periods after rainfall or snowmelt is not considered flooding, nor is water in swamps and marshes.

Table 15 gives the frequency and duration of flooding and the time of year when flooding is most likely to occur.

Frequency, duration, and probable dates of occurrence are estimated. Frequency is expressed as none, rare, common, occasional, and frequent. *None* means that flooding is not probable; *rare* that it is unlikely but possible under unusual weather conditions; *common* that it is likely under normal conditions; *occasional* that it occurs, on the average, no more than once in 2 years; and *frequent* that it occurs, on the average, more than once in 2 years. Duration is expressed as *very brief* if less than 2 days, *brief* if 2 to 7 days, and *long* if more than 7 days. Probable dates are expressed in months; November-May, for example, means that flooding can occur during the period November through May.

The information is based on evidence in the soil profile, namely thin strata of gravel, sand, silt, or clay deposited by floodwater; irregular decrease in organic matter content with increasing depth; and absence of distinctive horizons that form in soils that are not subject to flooding.

Also considered are local information about the extent and levels of flooding and the relation of each soil on the landscape to historic floods. Information on the extent of flooding based on soil data is less specific than that provided by detailed engineering surveys that delineate flood-prone areas at specific flood frequency levels.

High water table (seasonal) is the highest level of a saturated zone in the soil in most years. The depth to a seasonal high water table applies to undrained soils. The estimates are based mainly on the evidence of a saturated zone, namely grayish colors or mottles in the soil. Indicated in table 15 are the depth to the seasonal high water table; the kind of water table—that is, perched, artesian, or apparent; and the months of the year that the water table commonly is high. A water table that is seasonally high for less than 1 month is not indicated in table 15.

An *apparent* water table is a thick zone of free water in the soil. It is indicated by the level at which water stands in an uncased borehole after adequate time is allowed for adjustment in the surrounding soil. An *artesian* water table is under hydrostatic head, generally beneath an impermeable layer. When this layer is penetrated, the water level rises in an uncased borehole. A *perched* water table is water standing above an unsaturated zone. In places an upper, or perched, water table is separated from a lower one by a dry zone.

Only saturated zones within a depth of about 6 feet are indicated. A plus sign preceding the range in depth indicates that the water table is above the surface of the soil. The first numeral in the range indicates how high the water rises above the surface. The second numeral indicates the depth below the surface.

Depth to bedrock is given if bedrock is within a depth of 5 feet. The depth is based on many soil borings and on observations during soil mapping. The rock is specified as either soft or hard. If the rock is soft or fractured, excavations can be made with trenching machines, backhoes, or small rippers. If the rock is hard or massive, blasting or special equipment generally is needed for excavation.

Risk of corrosion pertains to potential soil-induced electrochemical or chemical action that dissolves or weakens uncoated steel or concrete. The rate of corrosion of uncoated steel is related to such factors as soil moisture, particle-size distribution, acidity, and

electrical conductivity of the soil. The rate of corrosion of concrete is based mainly on the sulfate and sodium content, texture, moisture content, and acidity of the soil. Special site examination and design may be needed if the combination of factors creates a severely corrosive environment. The steel in installations that intersect soil boundaries or soil layers is more susceptible to corrosion than steel in installations that are entirely within one kind of soil or within one soil layer.

For uncoated steel, the risk of corrosion, expressed as *low*, *moderate*, or *high*, is based on soil drainage class, total acidity, electrical resistivity near field capacity, and electrical conductivity of the saturation extract.

For concrete, the risk of corrosion is also expressed as *low*, *moderate*, or *high*. It is based on soil texture, acidity, and the amount of sulfates in the saturation extract.

Classification of the Soils

The system of soil classification used by the National Cooperative Soil Survey has six categories *(5)*. Beginning with the broadest, these categories are the order, suborder, great group, subgroup, family, and series. Classification is based on soil properties observed in the field or inferred from those observations or on laboratory measurements. Table 16 shows the classification of the soils in the survey area. The categories are defined in the following paragraphs.

ORDER. Ten soil orders are recognized. The differences among orders reflect the dominant soil-forming processes and the degree of soil formation. Each order is identified by a word ending in *sol*. An example is Ultisol.

SUBORDER. Each order is divided into suborders, primarily on the basis of properties that influence soil genesis and are important to plant growth or properties that reflect the most important variables within the orders. The last syllable in the name of a suborder indicates the order. An example is Aqult (*Aqu*, meaning water, plus *ult*, from Ultisol).

GREAT GROUP. Each suborder is divided into great groups on the basis of close similarities in kind, arrangement, and degree of development of pedogenic horizons; soil moisture and temperature regimes; and base status. Each great group is identified by the name of a suborder and by a prefix that indicates a property of the soil. An example is Hapludults (*Hapl*, meaning minimal horizonation, plus *udult*, the suborder of the Ultisols that have an udic moisture regime).

SUBGROUP. Each great group has a typic subgroup. Other subgroups are intergrades or extragrades. The typic is the central concept of the great group; it is not necessarily the most extensive. Intergrades are transitions to other orders, suborders, or great groups. Extragrades have some properties that are not representative of the great group but do not indicate transitions to any other known kind of soil. Each subgroup is identified by one or more adjectives preceding the name of the great group. The adjective *Typic* identifies the subgroup that typifies the great group. An example is Typic Hapludults.

FAMILY. Families are established within a subgroup on the basis of physical and chemical properties and other characteristics that affect management. Mostly the properties are those of horizons below plow depth where there is much biological activity. Among the properties and characteristics considered are particle-size class, mineral content, temperature regime, depth of the root zone, consistence, moisture equivalent, slope, and permanent cracks. A family name consists of the name of a subgroup preceded by terms that indicate soil properties. An example is clayey, mixed, thermic Typic Hapludults.

SERIES. The series consists of soils that have similar horizons in their profile. The horizons are similar in color, texture, structure, reaction, consistence, mineral and chemical composition, and arrangement in the profile. There can be some variation in the texture of the surface layer or of the substratum within a series.

Soil Series and Their Morphology

In this section, each soil series recognized in the survey area is described. The descriptions are arranged in alphabetic order.

Characteristics of the soil and the material in which it formed are identified for each series. The soil is compared with similar soils and with nearby soils of other series. A pedon, a small three-dimensional area of soil, that is typical of the series in the survey area is described. The detailed description of each soil horizon follows standards in the *Soil Survey Manual (4)*. Many of the technical terms used in the descriptions are defined in *Soil Taxonomy (5)*. Unless otherwise stated, colors in the descriptions are for moist soil. Following the pedon description is the range of important characteristics of the soils in the series.

The map units of each soil series are described in the section "Detailed Soil Map Units."

Barling Series

The Barling series consists of deep, moderately well drained, moderately permeable, level soils. These soils formed in alluvium derived from residuum of siltstone, shale, and sandstone. These soils are on flood plains that are occasionally flooded for brief periods during late winter and early spring. The native vegetation is mixed hardwoods. Slopes are 0 to 1 percent.

Barling soils in this survey area are geographically associated with Guthrie, Leadvale, Dela, Spadra, and Taft soils. Guthrie soils, which are on low terraces, upland flats, and in depressions, have a fine-silty control

section and a fragipan. Leadvale soils, which are on terraces and colluvial foot slopes, have a fine-silty control section and a fragipan. Dela soils, which are on natural levees, are well drained and have a coarse-loamy control section. Spadra soils, which are on higher stream terraces, are well drained and have a fine-loamy control section. Taft soils, which are on depressional terraces, upland flats, and in depressions, have a fragipan and are somewhat poorly drained.

Typical pedon of Barling silt loam, occasionally flooded, in the SW1/4SW1/4SE1/4 of sec. 15, T. 10 N., R. 9 W.; in Cleburne County:

Ap—0 to 5 inches; dark brown (10YR 4/3) silt loam; weak fine granular structure; very friable; many fine and medium roots; few fine pores; medium acid; clear smooth boundary.

BA—5 to 10 inches; dark brown (10YR 4/3) silt loam; weak medium subangular blocky structure; friable; many fine roots; few fine pores; medium acid; clear wavy boundary.

Bw1—10 to 16 inches; dark brown (10YR 4/3) silt loam; common fine faint dark yellowish brown mottles; weak medium subangular blocky structure; friable; common fine roots; few fine pores; strongly acid; gradual wavy boundary.

Bw2—16 to 32 inches; dark yellowish brown (10YR 4/4) silt loam; common medium distinct pale brown (10YR 6/3) and light brownish gray (10YR 6/2) mottles; weak medium subangular blocky structure; friable; few fine roots; few fine pores; strongly acid; gradual wavy boundary.

Bw3—32 to 48 inches; mottled dark yellowish brown (10YR 4/4) and light brownish gray (10YR 6/2) silt loam; common medium distinct pale brown (10YR 6/3) and gray (10YR 6/1) mottles; weak medium subangular blocky structure; friable; few fine roots and pores; strongly acid; gradual wavy boundary.

Bw4—48 to 72 inches; gray (10YR 6/1) silt loam; common medium distinct dark yellowish brown (10YR 4/4) and yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; few fine roots and pores; strongly acid.

The thickness of the solum is more than 60 inches. Reaction ranges from slightly acid to strongly acid in the A and BA horizons and slightly acid to very strongly acid in the Bw horizons. The depth to gray mottles ranges from 6 to 24 inches.

The A horizon has hue of 10YR, value of 4, and chroma of 2 or 3. Thickness of the A horizon ranges from 4 to 8 inches.

The BA and Bw1 horizons have hue of 10YR, value of 4, and chroma of 3 or 4. Mottles are in shades of brown and gray.

The Bw2 horizon and underlying horizons have hue of 10YR, value of 4 or 5, and chroma of 4. Mottles are in shades of brown and gray. These horizons are silt loam or loam. In some pedons below a depth of 30 inches, the Bw2 horizon and underlying horizons have hue of 10YR, value of 5 or 6, and chroma of 1 or 2. Mottles are in shades of brown equally mottled in shades of brown and gray.

Cane Series

The Cane series consists of deep, moderately well drained, slowly permeable, gently sloping soils that formed in colluvium, old alluvium, or valley fill from interbedded sandstone and shale. These soils are on convex side slopes of small hills and toe slopes of hills and mountains. The native vegetation is mixed pines and hardwoods. Slopes are 3 to 8 percent.

Cane soils in this survey area are geographically associated with Leadvale, Linker, Nella, and Sidon soils. Leadvale soils, which are on the lower terraces, have a fine-silty control section. Linker soils, which are on mountain plateaus, hillsides, and benches, are well drained and do not have a fragipan. Nella soils, which are on hillsides, mountainsides, foot slopes, and benches, do not have a fragipan and are well drained. Sidon soils, which are on hillsides, undulating plateaus, and benches, are not as red in color.

Typical pedon of Cane loam, 3 to 8 percent slopes, in the SE1/4SE 1/4NW1/4 of sec. 30, T. 11 N., R. 11 W.; in Cleburne County:

Ap—0 to 6 inches; brown (7.5YR 4/4) loam; weak fine granular structure; friable; many fine roots; medium acid; clear smooth boundary.

Bt1—6 to 13 inches; yellowish red (5YR 5/8) loam; weak medium subangular blocky structure; friable; thin patchy clay films on faces of peds; common fine roots; medium acid; gradual smooth boundary.

Bt2—13 to 23 inches; yellowish red (5YR 4/6) loam; moderate medium subangular blocky structure; friable; thin patchy clay films on faces of peds; few fine roots; strongly acid; clear smooth boundary.

Btx1—23 to 33 inches; yellowish red (5YR 4/6) clay loam; common medium distinct dark red (2.5YR 3/6), strong brown (7.5YR 5/6), and very pale brown (10YR 7/4) mottles; weak course prismatic structure parting to moderate medium subangular blocky; compact and brittle; thin patchy clay films on faces of peds; strongly acid; clear smooth boundary

Btx2—33 to 72 inches; red (2.5YR 4/6) clay loam; many medium prominent light gray (10YR 7/1) and common medium distinct very pale brown (10YR 7/3) and strong brown (7.5YR 5/6) mottles; weak course prismatic structure parting to moderate medium subangular blocky; compact and brittle; thin patchy clay films on faces of peds; strongly acid.

The thickness of the solum is more than 60 inches. Reaction ranges from medium acid to very strongly acid

throughout. Depth to the fragipan ranges from 20 to 32 inches. Content of sandstone fragments or quartzite pebbles ranges from 0 to 10 percent by volume.

The A horizon has hue of 10YR or 7.5YR, value of 4 or 5, chroma of 3 or 4. Thickness of the A horizon ranges from 4 to 10 inches.

The Bt horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 4, 6, or 8. It is loam, silty clay loam, clay loam, or sandy clay loam. The Btx horizon has hue of 2.5YR or 5YR, value of 4 or 5, and chroma of 6 or 8. It is mottled in shades of red, brown, or gray. The Btx horizon is silty clay loam, clay loam, sandy clay loam, or loam.

Ceda Series

The Ceda series consists of deep, well drained, rapidly permeable, level to nearly level soils that formed in gravelly alluvium derived from residuum of siltstone, shale, and sandstone. They are on narrow flood plains of streams. The native vegetation is mixed hardwoods and shortleaf pine. The slopes are 0 to 2 percent.

Ceda soils in this survey area are geographically associated with Enders, Kenn, Nella, Spadra, and Steprock soils. Enders soils, which are on adjacent hillsides, mountainsides, and ridges, have a clayey control section and very slow permeability. Kenn soils, which are on the same flood plains, are moderately permeable and have a fine-loamy control section. Nella soils, which are on adjacent hillsides, mountainsides, foot slopes, and benches, have a fine-loamy control section and moderate permeability. Spadra soils, which are on stream terraces, have a fine-loamy control section and moderate permeability. Steprock soils, which are on adjacent uplands, hillsides, and ridges, are moderately deep over sandstone and have an argillic horizon.

Typical pedon of Ceda gravelly loam in an area of Kenn-Ceda complex, frequently flooded, in the NW1/4NE1/4SW1/4 of sec. 20 T. 12 N., R. 16 W.; in Van Buren County:

A1—0 to 5 inches; very dark grayish brown (10YR 3/2) gravelly loam; moderate fine granular structure; friable; many fine roots; about 25 percent by volume fragments of sandstone and shale 0.25 inch to 1 inch in diameter; medium acid; clear smooth boundary.

C1—5 to 15 inches; dark brown (10YR 4/3) very gravelly loam; massive; friable; few fine roots; about 40 percent by volume fragments of sandstone and shale 0.25 inch to 1 inch in diameter; medium acid; clear smooth boundary.

C2—15 to 72 inches; brown (7.5YR 4/4) extremely gravelly loam; massive; friable; about 50 percent by volume fragments of sandstone 0.25 inch to 1 inch in diameter; about 20 percent by volume fragments of sandstone 1 inch to 3 inches in diameter; about 5 percent by volume fragments of sandstone 3 to 10 inches in diameter; medium acid.

The reaction of the soil is slightly acid or medium acid in all horizons.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. The amount of coarse fragments ranges from 15 to 35 percent by volume in the A horizon.

The C horizon has hue of 10YR, value of 4 or 5, and chroma of 3, 4, or 6; hue of 7.5YR, value of 4, and chroma of 4; or hue of 7.5YR, value of 5, and chroma of 6. It is very gravelly fine sandy loam, extremely gravelly fine sandy loam, very gravelly loam, or extremely gravelly loam. The amount of coarse fragments ranges from 35 to 50 percent by volume in the upper part of the C horizon and ranges to 85 percent by volume in the lower part of the C horizon.

Dela Series

The Dela series consists of deep, well drained, moderately rapidly permeable, level to nearly level soils that formed in thick, sandy and loamy sediments. These soils are on natural levees along the Little Red River and its tributaries. The native vegetation is mixed hardwoods and pines. Slopes are 0 to 2 percent.

Dela soils in this survey area are geographically associated with Barling, Guthrie, and Spadra soils. Barling soils, which are on flood plains, are moderately well drained and have a coarse-silty control section. Guthrie soils, which are on low terraces, upland flats, or in depressions are poorly drained and have a fine-silty control section. Spadra soils, which are on stream terraces, have a fine-loamy control section.

Typical pedon of Dela loamy fine sand, 0 to 2 percent slopes, in the NW1/4NW1/4SW1/4 of sec. 31, T. 10 N., R. 8 W.; in Cleburne County:

Ap—0 to 4 inches; dark brown (10YR 4/3) loamy fine sand; weak fine granular structure; very friable; many medium and fine roots; medium acid; clear wavy boundary.

A1—4 to 10 inches; brown (10YR 5/3) loamy fine sand; weak medium granular structure; common medium and fine roots; medium acid; clear smooth boundary.

C1—10 to 21 inches; strong brown (7.5YR 5/6) fine sandy loam; structureless; loose; few fine roots; thin strata of silt loam and loamy sand; strongly acid; clear wavy boundary.

C2—21 to 31 inches; strong brown (7.5YR 5/6) stratified loamy fine sand, fine sandy loam and silt loam; structureless; loose; few fine roots; very strongly acid; clear smooth boundary.

C3—31 to 47 inches; yellowish brown (10YR 5/6) loamy fine sand; structureless; loose; few fine roots; thin

strata of silt loam; very strongly acid; clear wavy boundary.
C4—47 to 57 inches; yellowish brown (10YR 5/6) fine sandy loam; structureless; loose; common medium distinct pale brown (10YR 6/3) mottles; thin strata of silt loam; few black and brown concretions; very strongly acid; gradual wavy boundary.
C5—57 to 72 inches; pale brown (10YR 6/3) very fine sandy loam; few medium distinct light brownish gray mottles; structureless; very friable; thin strata of loamy sand; few black and brown concretions; very strongly acid.

Reaction ranges from medium acid to very strongly acid throughout.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 2 or 3. Thickness of the A horizon ranges from 3 to 12 inches.

The C horizon has hue of 10YR, value of 5 or 6, and chroma of 3; hue of 10YR, value of 5, and chroma of 4 or 6; or hue of 7.5YR, value of 5, and chroma of 6 or 8. It is loamy fine sand, fine sandy loam, very fine sandy loam, or loam with strata of finer or coarser textures.

Enders Series

The Enders series consists of deep, very slowly permeable, gently sloping to steep soils. The soils formed in a layer of loamy material and clayey residuum of shale or interbedded sandstone, siltstone, and shale and sandstone. They are on sides and tops of hills, mountains, and ridges. The native vegetation is post oak, red oak, white oak, hickory, and shortleaf pine. The slopes are 3 to 40 percent.

Enders soils in this survey area are geographically associated with Ceda, Kenn, Leadvale, Linker, Mountainburg, Nella, and Steprock soils. Ceda soils, which are on narrow flood plains, have a loamy-skeletal control section and rapid permeability. Kenn soils, which are on narrow flood plains, have a fine-loamy control section and are moderately permeable. Leadvale soils, which are on low terraces and foot slopes, have a fragipan and a fine-silty control section. Linker soils, which are on benches, ridgetops, hillsides, and mountain plateaus, are moderately deep and have a fine-loamy control section. Mountainburg soils, which are on ridgetops and ledges, are less than 20 inches deep to bedrock and have a loamy-skeletal control section. Nella soils, which are on sides of hills and mountains, have a fine-loamy control section. Steprock soils, which are on hillsides, mountainsides, and ridges, have a loamy-skeletal control section and are moderately deep.

Typical pedon of Enders stony fine sandy loam, in an area of Enders-Steprock complex, 8 to 20 percent slopes, SW1/4SE1/4SW1/4 of sec. 22, T. 10 N., R. 10 W.; in Cleburne County:

O—1 inch to 0; litter of leaves and twigs.
A—0 to 2 inches; very dark grayish brown (10YR 3/2) stony fine sandy loam; weak fine granular structure; friable; many fine and medium roots; about 15 percent, by volume, sandstone fragments less than 10 inches in diameter and about 15 percent, by volume, surface stones more than 10 inches in diameter; very strongly acid; clear smooth boundary.
BA—2 to 7 inches; yellowish red (5YR 5/8) gravelly loam; weak medium subangular blocky structure; friable; common fine roots; about 20 percent, by volume, sandstone fragments 0.5 inch to 3 inches in diameter; very strongly acid; gradual wavy boundary.
Bt1—7 to 13 inches; red (2.5YR 4/8) silty clay; moderate medium subangular blocky structure; firm; few fine roots and pores; thick continuous clay films on faces of peds; very strongly acid; gradual wavy boundary.
Bt2—13 to 30 inches; red (2.5YR 4/8) clay; common medium distinct pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm; few fine roots and pores; thick continuous clay films on faces of peds; very strongly acid; gradual wavy boundary.
Bt3—30 to 37 inches; red (2.5YR 4/8) clay; common medium distinct gray (10YR 6/1) and pale brown (10YR 6/3) mottles; moderate medium subangular blocky structure; firm; few fine roots and pores; thick continuous clay films on faces of peds; very strongly acid; gradual wavy boundary.
BC—37 to 52 inches; mottled red (2.5YR 4/8) and gray 10YR 6/1) shaly silty clay; strong medium subangular blocky structure; firm; about 30 percent, by volume, fragments of shale; very strongly acid; gradual wavy boundary.
Cr—52 to 68 inches; gray (10YR 6/1) partly weathered shale with red (2.5YR 4/8) mottles on cleavage faces; very strongly acid.

The thickness of the solum ranges from 32 to 59 inches. Reaction is strongly acid or very strongly acid throughout. Depth to bedrock ranges from 40 to more than 62 inches. Content of coarse fragments ranges from 0 to 35 percent, by volume, in the A, BA, and Bt horizons and from 5 to 50 percent in the BC horizon.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. It is stony or gravelly fine sandy loam. Thickness of the A horizon ranges from 1 inch to 6 inches.

The BA horizon has hue of 7.5YR or 5 YR, value of 5, and chroma of 4, 6, or 8. It is fine sandy loam, loam, or silt loam or their gravelly analogs. Some pedons do not have a BA horizon. The Bt horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. The lower part of the Bt horizon is mottled in shades of brown, red, or gray. The Bt horizon is silty clay or clay. The BC horizon is mottled or variegated in shades of brown, red, and gray. It is silty clay or clay or their shaly or gravelly

analogs. The Cr horizon is weathered shale grading to hard shale bedrock.

Guthrie Series

The Guthrie series consists of deep, poorly drained, slowly permeable, level soils that formed in loamy sediments derived from residuum of weathered sandstone and shale. These soils are on upland flats and in depressions and are saturated with water late in the winter and early in the spring. The native vegetation is mixed hardwoods. Slopes are 0 to 1 percent.

Guthrie soils in this survey area are geographically associated with the Barling, Leadvale, Dela, and Spadra soils. Barling soils, which are on flood plains, have a coarse-silty control section and do not have a fragipan. Leadvale soils, which are on the higher part of terraces, have an argillic horizon above the fragipan and are moderately well drained. Dela soils, which are on natural levees of flood plains, do not have a fragipan and have a coarse-loamy control section. Spadra soils, which are on stream terraces, have a fine-loamy control section and do not have a fragipan.

Typical pedon of Guthrie silt loam, occasionally flooded, in the NW1/4SE1/4NE1/4 of sec. 4., T. 9 N., R. 8 W.; in Cleburne County:

Ap—0 to 5 inches; dark grayish brown (10YR 4/2) silt loam; weak fine and medium granular structure; friable; many fine and medium roots; strongly acid; clear smooth boundary.

E—5 to 14 inches; grayish brown (10YR 5/2) silt loam; common medium distinct yellowish brown (10YR 5/4) mottles; weak medium and fine subangular blocky structure; friable; common fine and medium roots; very strongly acid; gradual smooth boundary.

BEg—14 to 21 inches; light brownish gray (10YR 6/2) silt loam; common medium distinct yellowish brown (10YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine and medium roots; common fine and medium pores; very strongly acid; gradual smooth boundary.

Bg—21 to 27 inches; gray (10YR 6/1) silt loam; common medium distinct strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few fine and medium roots; few fine and medium pores; very strongly acid; clear irregular boundary.

Btx1—27 to 39 inches; gray (10YR 6/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm, hard and brittle; common pores; few light gray (10YR 7/1) silt pockets and coatings on peds; few concretions; very strongly acid; gradual irregular boundary.

Btx2—39 to 50 inches; gray (10YR 5/1) silty clay loam; common medium distinct yellowish brown (10YR 5/6) mottles; moderate coarse prismatic structure parting to moderate medium subangular blocky; firm, hard and brittle; few pores; common distinct clay films on faces of peds and in pores; few pockets and coatings of light gray (10YR 7/1) silt loam material; few concretions; about 70 percent of material is brittle; very strongly acid; gradual irregular boundary.

Btx3—50 to 72 inches; gray (10YR 5/1) silty clay loam; common medium distinct yellowish brown (10YR 5/8) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; firm, hard and brittle; common distinct clay films on peds and in pores; small pockets and coatings of light gray (10YR 7/1) silt loam material on peds; few small concretions; very strongly acid.

The thickness of the solum is more than 60 inches. Depth to the fragipan ranges from 20 to 36 inches. Reaction is very strongly acid or extremely acid except in areas where the surface layer has been limed.

The A horizon has hue of 10YR, value of 4 through 6, and chroma of 1 or 2.

The E horizon has hue of 10YR, value of 5 through 7, and chroma of 1 or 2.

The Btx horizon has hue of 10YR, value of 5 or 6, and chroma of 2 or less. It is silt loam or silty clay loam. The Btx horizon has few to many mottles in shades of yellow, brown, or red. In some pedons, this horizon is mottled in shades of gray, yellow, red, and brown and does not have a dominant color.

Kenn Series

The Kenn series consists of deep, well drained, moderately permeable, level to nearly level soils. The soils formed in loamy alluvium. They are on narrow flood plains of streams and tributaries. The native vegetation is mainly oaks, sweetgum, and shortleaf pine. Slopes are 0 to 2 percent.

Kenn soils in this survey area are geographically associated with the Ceda, Enders, Nella, and Spadra soils. Ceda soils, which are on the same flood plains, have a loamy-skeletal control section and rapid permeability. Enders soils, which are on adjacent hillsides, mountainsides, and ridges, have a clayey control section and very slow permeability. Nella soils, which are on adjacent hillsides, mountainsides, foot slopes, and benches, have a solum that is more than 60 inches thick. Spadra soils, which are on adjacent stream terraces, have fewer coarse fragments in the lower part of the subsoil.

Typical pedon of Kenn loam (fig. 15), in an area of Kenn-Ceda complex, frequently flooded, in a pasture in the SE1/4SW1/4NW1/4 of sec. 14, T. 13 N., R. 14 W.; in Van Buren County:

Figure 15.—A profile of Kenn loam is in an area of Kenn-Ceda complex, frequently flooded. The scale is in inches.

Ap—0 to 7 inches; brown (10YR 4/3) loam; weak medium granular structure; friable; about 5 percent, by volume, sandstone fragments; strongly acid; clear wavy boundary.

Bt—7 to 31 inches; yellowish red (5YR 4/6) gravelly sandy clay loam; weak fine subangular blocky structure; friable; thin patchy clay films on faces of peds; about 15 percent, by volume, sandstone fragments 0.25 inch to 3 inches in diameter; very strongly acid; gradual wavy boundary.

2BC—31 to 50 inches; yellowish red (5YR 4/6) very gravelly sandy clay loam; weak fine subangular blocky structure; friable; thin patchy clay films on faces of peds; about 40 percent, by volume, sandstone fragments 0.25 inch to 3 inches in diameter; about 10 percent, by volume, sandstone fragments to 10 inches in diameter; very strongly acid; gradual wavy boundary.

2C—50 to 72 inches; strong brown (7.5YR 5/6) very gravelly fine sandy loam; massive; friable; about 40 percent, by volume, sandstone fragments 0.25 inch to 3 inches in diameter; about 20 percent, by volume, sandstone fragments 3 to 10 inches in diameter; very strongly acid.

The thickness of the solum is 40 to 60 inches. Reaction is strongly acid or very strongly acid throughout. Depth to the very gravelly 2BC horizon ranges from 20 to 40 inches.

The A horizon has hue of 7.5YR or 10YR, value of 3 or 4, and chroma of 2, 3, or 4. It is mainly loam but ranges to fine sandy loam or their gravelly analogs. The A horizon ranges from 4 to 11 inches in thickness.

The Bt horizon has hue of 5YR or 7.5YR, value of 4 or 5, and chroma of 4 or 6. It is gravelly clay loam, gravelly sandy clay loam, clay loam, or sandy clay loam. Sandstone fragments 0.25 inch to 3 inches are about 5 to 35 percent, by volume.

The 2BC horizon has colors similar to those of the Bt horizon. It is very gravelly sandy clay loam, very gravelly clay loam, cobbly sandy clay loam, or cobbly clay loam. Sandstone fragments 0.25 inch to 3 inches are about 35 to 60 percent, by volume. Fragments larger than 3 inches are about 0 to 40 percent, by volume.

The 2C horizon has hue of 7.5YR or 10YR, value of 4 or 5, and chroma of 4 or 6. It is very gravelly loam, very gravelly fine sandy loam, extremely gravelly loam, extremely gravelly fine sandy loam, cobbly loam, or cobbly fine sandy loam. Sandstone fragments 0.25 inch to 3 inches are about 40 to 75 percent, by volume. Fragments larger than 3 inches are about 5 to 40 percent, by volume. Total sandstone fragments in this horizon range from 60 to 90 percent, by volume.

Leadvale Series

The Leadvale series consists of deep, moderately well drained soils with moderately slow to slow permeability. The nearly level to gently sloping soils formed in loamy material in the uplands or local loamy alluvium from nearby uplands underlain largely by shale and siltstone. They are on colluvial foot slopes and on old stream terraces. The native vegetation is mixed hardwoods. Slopes are 1 to 8 percent.

Leadvale soils in this survey area are geographically associated with Barling, Cane, Enders, Guthrie, Linker, and Taft soils. Barling soils, which are on flood plains, do not have a fragipan. Cane soils, which are on convex slopes of small hills and on toe slopes of hills and mountains, have a fine-loamy control section. Enders soils, which are on hillsides, mountainsides, and ridges, have a clayey control section and do not have a fragipan. Guthrie soils, which are on upland flats and in depressions, do not have an argillic horizon above the fragipan and are poorly drained. Linker soils, which are on hillsides, ridgetops, and benches, are moderately deep to sandstone bedrock and do not have a fragipan. Taft soils, on terraces at lower elevations, are somewhat poorly drained.

Typical pedon of Leadvale silt loam, 1 to 3 percent slopes, in the SE1/4SW1/4NE1/4 of sec. 16, T. 10 N., R. 8 W.; in Cleburne County:

Ap—0 to 6 inches; brown (10YR 4/3) silt loam; weak fine granular structure; friable; many fine and medium roots; strongly acid; abrupt smooth boundary.

Bt1—6 to 18 inches; yellowish brown (10YR 5/6) silty clay loam; moderate medium subangular blocky structure; friable; common fine roots; thin patchy clay films on faces of peds; very strongly acid; clear smooth boundary.

Bt2—18 to 23 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct pale brown (10YR 6/3) and strong brown (7.5YR 5/8) mottles; moderate medium subangular blocky structure; friable; few fine roots; thin patchy clay films on faces of peds; few fine black concretions; very strongly acid; clear wavy boundary.

Btx—23 to 39 inches; yellowish brown (10YR 5/6) silty clay loam; common medium distinct gray (10YR 6/1) and strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm and brittle; thin patchy clay films on faces of peds; pockets of gray silt; few soft brown and black concretions; very strongly acid; gradual wavy boundary.

BC—39 to 51 inches; mottled yellowish brown (10YR 5/6) and gray (10YR 5/1) silty clay loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; firm; few thin patchy clay films on faces of peds; few fine black concretions; very strongly acid.

R—51 inches; interbedded acid shale and sandstone.

The thickness of the solum and depth to bedrock range from 50 to 70 inches or more. Reaction is strongly acid or very strongly acid throughout. Depth to the fragipan ranges from 16 to 38 inches.

The A horizon ranges in thickness from 4 to 8 inches. It has hue of 10YR, value of 4 through 6, and chroma of 3; or hue of 10YR, value of 4, and chroma of 2.

The Bt horizon has hue of 10YR, value of 5 or 6, and chroma of 6 or 8; or hue of 7.5YR, value of 5, and chroma of 6 or 8. It is silt loam or silty clay loam. The Btx horizon is similar in range of color and texture to that of the Bt horizon with mottles in shades of brown and gray, or it is equally mottled in shades of brown, yellow, and gray.

The BC horizon is mottled in shades of brown, yellow, and gray. It is silty clay loam or silty clay.

Linker Series

The Linker series consists of moderately deep, well drained, moderately permeable, gently sloping to moderately steep soils. The soils formed in loamy residuum of sandstone. They are on hillsides, ridgetops, and benches. The native vegetation is mixed hardwoods. Slopes are 3 to 20 percent.

Linker soils in this survey area are geographically associated with Cane, Enders, Leadvale, Nauvoo, Nella, Mountainburg, Sidon, and Steprock soils. Cane soils, which are on toe slopes of hills and mountains, are moderately well drained and have a fragipan. Enders soils, which are on hillsides, mountainsides, and ridges, are more than 40 inches deep to bedrock and have a clayey control section. Leadvale soils, which are on low terraces, are more than 40 inches deep to bedrock and have a fragipan. Mountainburg soils, which are on the tops and sides of ridges, hills, and mountains, have a loamy-skeletal control section and are 20 inches deep or less to bedrock. Nauvoo soils, which are on hillsides or ridgetops are 40 inches deep or more to bedrock. Nella soils, which are on adjacent hillsides and foot slopes, have a solum that is more than 60 inches deep. Sidon soils, which are on adjacent benches and plateaus, are more than 40 inches deep to bedrock and have a fragipan. Steprock soils, which are in similar positions as Linker soils, have a loamy-skeletal control section and are less than 40 inches deep to soft bedrock.

Typical pedon of Linker gravelly fine sandy loam, in an area of Linker-Mountainburg complex, 3 to 8 percent slopes, in the SW1/4SE1/4SW1/4 of sec. 34, T. 11 N., R. 16 W; in Van Buren County:

A—0 to 5 inches; dark brown (10YR 4/3) gravelly fine sandy loam; weak fine granular structure; very friable; many fine and medium roots; about 15 percent, by volume, sandstone fragments 0.25 inch to 3 inches in diameter; strongly acid; clear smooth boundary.

BA—5 to 12 inches; strong brown (7.5YR 5/6) loam; weak fine subangular blocky structure; friable; common fine roots; few fine pores; about 10 percent, by volume, sandstone fragments 0.25 inch to 3 inches in diameter; strongly acid; clear smooth boundary.

Bt1—12 to 24 inches; yellowish red (5YR 5/6) loam; moderate medium subangular blocky structure; friable; thin patchy clay films on faces of peds; few fine roots and pores; very strongly acid; gradual wavy boundary.
Bt2—24 to 32 inches; yellowish red (5YR 5/6) sandy clay loam; moderate medium subangular blocky structure; friable; thin patchy clay films on faces of peds; few fine roots and pores; very strongly acid; abrupt wavy boundary.
R—32 to 35 inches; hard, level-bedded acid sandstone.

The thickness of the solum and the depth to bedrock range from 20 to 40 inches. Reaction is strongly acid to extremely acid throughout.

The A horizon has hue of 10YR, value of 4 or 5, and chroma of 3; hue of 10YR, value of 4, and chroma of 2 or 4; or hue of 7.5YR, value of 4 or 5, and chroma of 4. It is fine sandy loam or gravelly fine sandy loam.

The BA horizon, has hue of 5YR or 7.5YR, a value of 4 or 5, and chroma of 6. It is fine sandy loam or loam or their gravelly analogs. Some pedons do not have a BA horizon.

The Bt horizon has hue of 2.5YR, value of 4 or 5, and chroma of 6 or 8. It is sandy clay loam, clay loam, or loam.

The BC horizon, if present, is similar in range of color to that of the Bt horizon. It is sandy clay loam, clay loam, loam or their gravelly analogs.

Mountainburg Series

The Mountainburg series consists of shallow, well drained, moderately rapidly permeable, nearly level to very steep soils. The soils formed in residuum of hard, massive sandstone and in interbedded sandstone, siltstone, and shale. These soils are on the tops and sides of ridges, hills, and mountains. The native vegetation is mixed hardwoods. Slopes are 1 to 60 percent.

Mountainburg soils in this survey are geographically associated with Enders, Linker, Nella, and Steprock soils. Enders soils, which are on adjacent side slopes, hillsides, mountainsides, and ridges, have a clayey control section and are deep to bedrock. Linker soils, which are on plateaus, hillsides, ridgetops, and benches, are moderately deep to bedrock and have a fine-loamy control section. Nella soils, which are on foot slopes, hillsides, mountainsides, and benches, are deep and have a fine-loamy control section. Steprock soils, which are on adjacent hillsides and on the lower part of ridges, are less than 40 inches deep to soft bedrock.

Typical pedon of Mountainburg stony fine sandy loam in an area of Steprock-Mountainburg complex, 8 to 20 percent slopes, in the SW1/4NW1/4NW1/4 of sec. 21, T. 13 N., R. 14 W.; in Van Buren County:

A—0 to 2 inches; very dark grayish brown (10YR 3/2) stony fine sandy loam; weak medium granular structure; very friable; many fine roots; about 15 percent, by volume, sandstone fragments less than 3 inches in diameter and about 25 percent, by volume, flagstones and stones up to 25 inches in diameter; strongly acid; clear smooth boundary.
E—2 to 7 inches; yellowish brown (10YR 5/4) stony fine sandy loam; weak medium granular structure; very friable; many fine roots; about 20 percent, by volume, sandstone gravel smaller than 3 inches in diameter and 20 percent, by volume, flagstones and stones 3 to 25 inches in diameter; very strongly acid; clear wavy boundary.
Bt—7 to 17 inches; strong brown (7.5YR 5/6) very gravelly sandy clay loam; weak medium subangular blocky structure; friable; thin patchy clay films on faces of peds; common fine roots; few fine pores; about 40 percent, by volume, gravel smaller than 3 inches in diameter and about 10 percent, by volume, flagstones 3 to 10 inches in diameter; very strongly acid; abrupt smooth boundary.
R—17 to 20 inches; hard sandstone bedrock.

The thickness of the solum and depth to bedrock range from 12 to 20 inches. Reaction is very strongly acid or strongly acid throughout. Sandstone fragments make up 15 to about 50 percent of the A and E horizons and 35 to about 60 percent of the Bt horizon.

The A horizon ranges from about 1 to 3 inches in thickness. The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. It is gravelly fine sandy loam or stony fine sandy loam.

The E horizon has hue of 10YR, value of 4 or 5, and chroma of 3 or 4; or hue of 10YR, value of 5, and chroma of 6. It is very gravelly fine sandy loam, gravelly fine sandy loam, or stony fine sandy loam.

The Bt horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 6 or has hue of 5YR, value of 4, and chroma of 8. It is very gravelly fine sandy loam, very gravelly loam, or very gravelly sandy clay loam.

Nauvoo Series

The Nauvoo series consists of deep, well drained, moderately permeable, gently sloping soils on hillsides and ridgetops. These soils formed in loamy residuum material of sandstone or interbedded sandstone, siltstone, and shale. The native vegetation is mixed hardwoods and pines. Slopes range from 3 to 8 percent.

Nauvoo soils are geographically associated with Linker, Sidon, and Steprock soils. Linker soils, which are on hillsides, ridgetops, and benches, are moderately deep to hard sandstone bedrock. Sidon soils, which are on upland plateaus and benches, are moderately well drained and have a fragipan. Steprock soils, which are in lower positions than Nauvoo soils and are on the sides

of ridges and hills, have a loamy-skeletal control section and are moderately deep.

Typical pedon of Nauvoo fine sandy loam, 3 to 8 percent slopes, in the SE1/4SE1/4SW1/4 of sec. 34, T. 10 N., R. 12 W.; in Van Buren County:

A—0 to 6 inches; dark brown (10YR 4/3) fine sandy loam; weak fine and medium granular structure; friable; many fine and medium roots; 10 percent sandstone fragments less than 1 inch in diameter; very strongly acid; abrupt smooth boundary.

BA—6 to 12 inches; strong brown (7.5YR 5/8) fine sandy loam; weak medium subangular blocky structure; friable; common fine and medium roots; common fine and medium pores; 10 percent sandstone fragments less than 1 inch in diameter; very strongly acid; clear wavy boundary.

Bt—12 to 33 inches; yellowish red (5YR 5/8) sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots; common fine and medium pores; thin patchy clay films on faces of peds; about 5 percent sandstone fragments less than 1 inch in diameter; very strongly acid; clear wavy boundary.

BC—33 to 43 inches; yellowish red (5YR 5/6) fine sandy loam; few fine distinct pale brown (10YR 6/3) and red (2.5YR 4/8) mottles; weak medium subangular blocky structure; friable; thin patchy clay films on faces of peds; about 10 percent sandstone fragments less than 1 inch in diameter; very strongly acid.

Cr—43 to 60 inches; yellowish red and gray weathered level-bedded sandstone.

The thickness of the solum ranges from 30 to 50 inches and depth to weathered bedrock ranges from 40 to 60 inches. Depth to hard sandstone is 60 inches or more. Reaction is strongly acid or very strongly acid throughout.

The A horizon ranges from 4 to 8 inches in thickness. It has hue of 10YR, value of 4 or 5, and chroma of 3. Coarse fragments range from 0 to 15 percent by volume.

The BA horizon has hue of 5YR or 7.5YR, value of 5, and chroma of 6 or 8. It is fine sandy loam or loam. The Bt horizon has hue of 5YR, value of 4 or 5, and chroma of 6 or 8; or hue of 2.5YR, value of 4, and chroma of 6 or 8. It is loam, clay loam, or sandy clay loam. In some pedons, the lower part of the Bt horizon is mottled in shades of yellow or brown. The BC horizon has colors similar to those of the Bt horizon or is mottled in shades of red, yellow, or brown. It is fine sandy loam or loam. Coarse fragments range from 0 to 10 percent.

The Cr horizon is level-bedded, partly weathered sandstone or interbedded sandstone, siltstone, and shale. Colors are in shades of red, yellow, and gray.

Nella Series

The Nella series consists of deep, well drained, moderately permeable, moderately sloping to steep soils that formed in loamy colluvium derived from interbedded sandstone, siltstone, and shale. These soils are on hillsides, mountainsides, foot slopes, or concave parts of benches. The native vegetation is mainly oak, hickory, and pine. The slopes are 8 to 40 percent.

Nella soils in this survey area are geographically associated with the Cane, Ceda, Enders, Kenn, Linker, Mountainburg, Sidon, and Steprock soils. Cane soils, which are on toe slopes of hills and mountains and on convex slopes of small hills, have a fragipan and are moderately well drained. Ceda soils, which are on narrow flood plains, have a loamy-skeletal control section and are rapidly permeable. Enders soils, which are on hillsides, mountainsides, and ridges, have a clayey control section and are very slowly permeable. Kenn soils, which are on narrow flood plains, have a solum that is 40 to 60 inches thick. Linker soils, which are on hillsides, ridgetops, and benches, are moderately deep. Mountainburg soils, which are on tops and sides of ridges, hills, and mountains, are less than 20 inches deep to bedrock and have a loamy-skeletal control section. Sidon soils, which are on upland plateaus and broad benches, have a fragipan and are moderately well drained. Steprock soils, which are on adjacent hillsides and ridges, are moderately deep and have a loamy-skeletal control section.

Typical pedon of Nella stony fine sandy loam, in an area of Enders-Nella-Steprock complex, 8 to 20 percent slopes, in the NW1/4SW1/4SW1/4 of sec. 36, T. 11 N., R. 16 W.; in Van Buren County:

A—0 to 3 inches; dark grayish brown (10YR 4/2) stony fine sandy loam; weak fine granular structure; friable; many fine and medium roots; about 15 percent, by volume, sandstone fragments more than 10 inches in diameter on the surface and about 10 percent, by volume, sandstone fragments less than 10 inches in diameter; strongly acid; clear smooth boundary.

E—3 to 10 inches; yellowish brown (10YR 5/4) gravelly fine sandy loam; weak fine granular structure; friable; common medium and fine roots; about 15 percent, by volume, sandstone fragments mostly less than 3 inches in diameter; strongly acid; gradual wavy boundary.

Bt1—10 to 22 inches; yellowish red (5YR 5/6) gravelly sandy clay loam; weak medium subangular blocky structure; friable; few fine roots and pores; thin patchy clay films on faces of peds; about 15 percent, by volume, sandstone fragments mostly less than 3 inches in diameter; very strongly acid; gradual wavy boundary.

Bt2—22 to 42 inches; yellowish red (5YR 4/6) gravelly sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots and pores; thin patchy clay films on faces of peds; about 20 percent, by volume, sandstone fragments mostly less than 3 inches in diameter; very strongly acid; gradual wavy boundary.
Bt3—42 to 54 inches; yellowish red (5YR 4/8) very gravelly sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots and pores; thin patchy clay films on faces of peds; about 35 percent, by volume, sandstone fragments mostly less than 3 inches in diameter; very strongly acid; gradual wavy boundary.
Bt4—54 to 72 inches; red (2.5YR 5/6) very gravelly sandy clay loam; moderate medium subangular blocky structure; friable; few fine roots and pores; thin patchy clay films on faces of peds; about 45 percent, by volume, sandstone fragments mostly less than 3 inches in diameter; very strongly acid.

The thickness of the solum ranges from 60 to 80 inches. Reaction is strongly acid or very strongly acid throughout.

The A horizon has hue of 10YR, value of 4, and chroma of 2 or 3; or hue 7.5YR, value of 4, and chroma of 4. The thickness of the A horizon ranges from 2 to 8 inches. Texture is gravelly fine sandy loam or stony fine sandy loam.

The E horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4.

The Bt horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. Texture is gravelly sandy clay loam or gravelly clay loam in the upper part of the horizon ranging to very gravelly sandy clay loam or very gravelly clay in the lower part. In some pedons, mottles in shades of brown, yellow, and red are in the lower part of the Bt horizon.

The Nella soils in this survey area are taxadjuncts to the Nella series because they typically have more than 35 percent coarse fragments at a depth of more than 40 inches. This percentage is greater than is defined as the range for the Nella series. This difference, however, does not alter the use, behavior, or management of the soils.

Sidon Series

The Sidon series consists of deep, moderately well drained, slowly permeable soils. The soils formed in residuum of interbedded sandstone, shale, and siltstone. The nearly level to gently sloping soils are on undulating upland plateaus, hillsides, and broad benches. The native vegetation is mixed hardwoods and pines. Slopes are 1 to 8 percent.

Sidon soils in this survey area are geographically associated with Cane, Linker, Nella, Nauvoo, and Steprock soils. Cane soils, which are on toe slopes and convex side slopes, are redder in color. Linker soils, which are on adjacent benches and plateaus, are moderately deep and do not have a fragipan. Nauvoo soils, which are on hillsides and ridgetops, are well drained and do not have a fragipan. Nella soils, which are on hillsides and foot slopes, do not have a fragipan and are well drained. Steprock soils, which are on side slopes, do not have a fragipan and have a loamy-skeletal control section.

Typical pedon of Sidon fine sandy loam, 1 to 3 percent slopes, in the SE1/4NE1/4NW1/4 of sec. 24, T. 10 N., R. 8 W.; in Cleburne County:

Ap—0 to 6 inches; brown (10YR 4/3) fine sandy loam; weak medium granular structure; friable; many fine roots; strongly acid; abrupt smooth boundary.
Bt1—6 to 15 inches; strong brown (7.5YR 5/6) clay loam; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; few thin patchy clay films on faces of peds and in pores; few fine dark concretions; very strongly acid; gradual wavy boundary.
Bt2—15 to 24 inches; yellowish brown (10YR 5/8) clay loam; moderate medium subangular blocky structure; friable; common fine roots; common fine pores; thin patchy clay films on faces of peds and in pores; few fine dark concretions; very strongly acid; gradual wavy boundary.
Btx—24 to 39 inches; strong brown (7.5YR 5/8) clay loam; common medium distinct gray (10YR 6/1), yellowish red (5YR 4/6), and pale brown (10YR 6/3) mottles; weak coarse prismatic structure parting to moderate medium angular blocky; firm, compact and brittle; discontinuous distinct clay films on faces of peds and in pores; streaks of light colored silt and sand grains between prisms; prisms are about 3 inches wide; about 65 percent of material is brittle; extremely acid; gradual smooth boundary.
BC—39 to 48 inches; strong brown (7.5YR 5/8) sandy clay loam; common medium distinct red (2.5YR 4/6) and gray (10YR 6/1) mottles; moderate coarse platy structure parting to moderate medium subangular blocky; firm; discontinuous gray clay films on faces of peds; about 10 percent, by volume, flat sandstone fragments 1 inch to 2 inches in diameter; extremely acid; clear wavy boundary.
R—48 to 50 inches; horizontal bedded hard sandstone bedrock.

The thickness of the solum and depth to bedrock range from 40 to more than 60 inches. Depth to the fragipan ranges from 20 to 36 inches. Reaction ranges from strongly acid to extremely acid throughout.

The Ap or A horizon is 4 to 8 inches thick. It has hue of 10YR, value of 4 and 5, and chroma of 3 or 4.

The Bt1 horizon has hue of 7.5YR or 10YR, value of 5, and chroma of 6 or 8. The Bt2 horizon has hue of 10YR

or 7.5YR, value of 5, and chroma of 6 or 8. It has none to common mottles in shades of gray below a depth of 16 inches. The Bt horizon is clay loam or loam.

The Btx horizon has hue of 10YR or 7.5YR, value of 5, and chroma of 6 or 8. It has few to many mottles in shades of brown, gray, and red; or it may be equally mottled in shades of brown, gray, or red. The Btx horizon is loam, clay loam, or sandy clay loam or their gravelly analogs.

The BC horizon has colors similar to those of the Btx horizon. It is sandy loam, sandy clay loam, clay loam or their gravelly or very gravelly analogs.

The Cr horizon, if present, is about 1 to 4 inches thick. It is reddish, brownish, or grayish weathered sandstone.

The R horizon is hard, level-bedded acid sandstone that has few cracks that have horizontal spacing of 6 inches or more.

Spadra Series

The Spadra series consists of deep, well drained, moderately permeable soils. The soils formed in loamy alluvial material weathered from sandstone, siltstone, and shale. They are on level to undulating stream terraces. The native vegetation is mixed hardwoods and shortleaf pine. Slopes are 0 to 5 percent.

Spadra soils in this survey area are geographically associated with Barling, Ceda, Guthrie, Kenn, and Dela soils. Barling soils, which are on flood plains, are moderately well drained and have a coarse-silty control section. Ceda soils, which are on flood plains, have a loamy-skeletal control section and do not have an argillic horizon. Guthrie soils, which are in depressions on terraces, have a fine-silty control section and have a fragipan. Kenn soils, which are on flood plains, have more than 35 percent, by volume, coarse fragments at a depth of 20 to 40 inches. Dela soils, which are on natural levees, have a coarse-loamy control section.

Typical pedon of Spadra loam, occasionally flooded, in the NW1/4SW1/4NW1/4 of sec. 14, T. 13 N., R. 14 W.; in Van Buren County:

Ap—0 to 6 inches; dark brown (10YR 4/3) loam; weak fine granular structure; friable; many fine and medium roots; strongly acid; clear smooth boundary.

Bt—6 to 36 inches; brown (7.5YR 4/4) loam; weak medium subangular blocky structure; friable; thin patchy clay films on faces of peds; common fine roots; very strongly acid; gradual smooth boundary.

BC—36 to 50 inches; brown (7.5YR 4/4) fine sandy loam; weak medium subangular blocky structure; friable; few fine roots; very strongly acid; gradual wavy boundary.

C—50 to 72 inches; reddish brown (5YR 4/4) fine sandy loam; massive; friable; very strongly acid.

The thickness of the solum ranges from 40 to 60 inches. Reaction of the soil ranges from medium acid to very strongly acid throughout.

The A horizon has hue of 7.5YR, value of 4, and chroma of 4; or hue of 10YR, value of 4, and chroma of 3 or 4. The thickness of the A horizon ranges from 4 to 9 inches.

The Bt horizon has hue of 7.5YR, value of 4, and chroma of 4; or hue of 5YR, value of 4 or 5, and chroma of 4 or 6. It is loam or sandy clay loam.

The BC and C horizons have hue of 7.5YR or 5YR, value of 4 or 5, and chroma of 4 or 6. These horizons are loam, sandy loam, or fine sandy loam or their gravelly analogs.

Steprock Series

The Steprock series consists of moderately deep, well drained, moderately permeable, gently sloping to very steep soils. The soils formed in loamy residual and colluvial material of interbedded sandstone, siltstone, and shale. These soils are on sides of hills, mountains, and ridges. The native vegetation is mixed hardwoods and pines. Slopes are 3 to 60 percent.

Steprock soils in this survey area are geographically associated with Ceda, Enders, Linker, Mountainburg, Nauvoo, and Nella soils. Ceda soils, which are on narrow flood plains, do not have an argillic horizon and are deep. Enders soils, which are on hillsides, mountainsides, and ridges, have a clayey control section and very slow permeability. Linker soils, which are in similar positions on the landscape as Steprock soils, have a fine-loamy control section and are 20 to 40 inches deep to hard bedrock. Mountainburg soils, which are on ridgetops and ledges, are less than 20 inches deep to bedrock and have moderately rapid permeability. Nauvoo soils, which are in similar positions on the landscape, have a fine-loamy control section and are deep. Nella soils, which are on hillsides, mountainsides, benches, and foot slopes, have a fine-loamy control section and solum that is 60 inches or more thick.

Typical pedon of Steprock gravelly fine sandy loam, in an area of Steprock-Linker complex, 3 to 8 percent slopes, in the NE1/4NE1/4SW1/4 of sec. 16, T. 9 N., R. 8 W.; in Cleburne County:

A—0 to 4 inches; dark brown (10YR 4/3) gravelly fine sandy loam; weak fine granular structure; very friable; many fine roots; about 20 percent, by volume, sandstone gravel 0.25 to 3 inches in diameter and about 10 percent, by volume, sandstone fragments 3 to 8 inches in diameter; medium acid; clear smooth boundary.

BA—4 to 8 inches; strong brown (7.5YR 5/6) gravelly loam; weak fine subangular blocky structure; friable; common fine roots; about 20 percent, by volume, sandstone gravel 0.25 inches to 3 inches in

diameter and about 10 percent, by volume, flat sandstone fragments greater than 3 inches in diameter; strongly acid; gradual smooth boundary.

Bt1—8 to 18 inches; yellowish red (5YR 5/6) very gravelly loam; moderate medium subangular blocky structure; friable; few fine roots and pores; thin patchy clay films on faces of peds; about 35 percent, by volume, sandstone gravel 0.25 inch to 3 inches in diameter and about 20 percent, by volume, flat sandstone fragments 3 to 10 inches in diameter; very strongly acid; gradual wavy boundary.

Bt2—18 to 27 inches; yellowish red (5YR 5/6) very gravelly loam; moderate medium subangular blocky structure; friable; few fine roots and pores; thin patchy clay films on faces of peds; about 40 percent, by volume, sandstone fragments 0.25 inch to 3 inches in diameter and about 20 percent, by volume, flat sandstone fragments 3 to 10 inches in diameter; very strongly acid; clear irregular boundary.

Cr—27 to 46 inches; yellowish red (5YR 5/6) weathered sandstone.

The thickness of the solum and depth to the Cr horizon range from 20 to 40 inches. Depth to unweathered hard bedrock is 60 inches or more. Reaction ranges from strongly acid to very strongly acid throughout except in areas where the surface layer has been limed.

The A horizon has hue of 10YR, value of 3 or 4, and chroma of 2 or 3. Thickness of the A horizon ranges from 2 to 8 inches. Coarse fragments less than 3 inches in diameter range from 15 to 35 percent, by volume, and coarse fragments larger than 3 inches in diameter range from 5 to 30 percent, by volume. The A horizon is gravelly or stony fine sandy loam.

The BA horizon, if present, has hue of 7.5YR or 5YR, value of 5, and chroma of 6 or 8. It is fine sandy loam or loam or their gravelly or very gravelly analogs. Sandstone, siltstone, or shale fragments less than 3 inches in diameter range from 15 to 35 percent, and larger fragments range from 5 to 30 percent.

The Bt horizon has hue of 5YR or 2.5YR, value of 4 or 5, and chroma of 6 or 8. In some pedons, the lower part of the Bt horizon has hue of 7.5YR, value of 5, and chroma of 6 or 8. Mottles are in shades of red. The Bt horizon is sandy clay loam, clay loam, or loam or their very gravelly analogs. Sandstone, siltstone, or shale fragments less than 3 inches in diameter range from 30 to 50 percent, and larger fragments range from 5 to 20 percent, by volume.

The Cr horizon is partly weathered sandstone, siltstone, or shale or interbedded layers of these materials.

Taft Series

The Taft series consists of deep, somewhat poorly drained, slowly permeable, level to nearly level soils. The soils formed in loamy material from nearby uplands weathered from shale and siltstone. They are on stream terraces and upland flats and in depressions. They have a seasonal perched water table late in the winter and early in the spring. The native vegetation is mixed hardwoods. Slopes are 0 to 2 percent.

Taft soils in this survey area are geographically associated with Barling and Leadvale soils. Barling soils, which are on flood plains, are moderately well drained and do not have a fragipan. Leadvale soils, which are on higher terraces and colluvial foot slopes, have an argillic horizon above the fragipan and are moderately well drained.

Typical pedon of Taft silt loam, 0 to 2 percent slopes, in the NE1/4SW1/4NW1/4 of sec. 16, T. 10 N., R. 9 W.; in Cleburne County:

Ap—0 to 4 inches; dark grayish brown (10YR 4/2) silt loam; weak fine granular structure; very friable; many fine and medium roots; medium acid; clear wavy boundary.

E—4 to 10 inches; pale brown (10YR 6/3) silt loam; weak medium granular structure; friable; many fine and medium roots; strongly acid; clear smooth boundary.

Bw—10 to 23 inches; yellowish brown (10YR 5/4) silt loam; common medium distinct light brownish gray (10YR 6/2) and strong brown (7.5YR 5/6) mottles; weak medium subangular blocky structure; friable; common fine roots; very strongly acid; clear wavy boundary.

E/Btx—23 to 30 inches; light yellowish brown (10YR 6/4) and light brownish gray (10YR 6/2) silt loam; common medium distinct strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to weak medium subangular blocky; friable; slightly brittle; few fine roots; very strongly acid; clear irregular boundary.

Btx1—30 to 43 inches; light yellowish brown (10YR 6/4) silty clay loam; common medium distinct gray (10YR 6/1) and strong brown (7.5YR 5/6) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm; compact and brittle; common patchy distinct clay films on faces of peds; common veins of gray silt and silty clay; very strongly acid; gradual wavy boundary.

Btx2—43 to 57 inches; light yellowish brown (10YR 6/4) and gray (10YR 6/1) silty clay loam; common medium distinct strong brown (7.5YR 5/6) and yellowish red (5YR 5/8) mottles; weak coarse prismatic structure parting to moderate medium subangular blocky; firm, compact and brittle; common patchy distinct clay films on faces of peds;

common veins of gray silt and silty clay; very strongly acid; gradual wavy boundary.

Bt—57 to 72 inches; yellowish red (5YR 5/6) silty clay loam; common medium distinct gray (10YR 6/1), strong brown (7.5YR 5/6), and light yellowish brown (10YR 6/4) mottles; moderate medium subangular blocky structure; firm; thin patchy clay films on faces peds; common veins of gray silty clay; very strongly acid.

The thickness of the solum is 50 inches or more. Depth to the fragipan ranges from 20 to 36 inches. Reaction is strongly acid or very strongly acid throughout except in areas where the surface layer has been limed.

The A horizon has hue of 10YR, value of 5, and chroma of 3; or hue of 10YR, value of 4, and chroma of 2. Thickness of the A horizon ranges from 2 to 7 inches.

The E horizon has hue of 10YR, value of 5, and chroma of 3 or 4; or hue of 10YR, value of 6, and chroma of 3.

The B horizon has hue of 10YR, value of 5 or 6, and chroma of 3 or 4. It is silt loam or silty clay loam. Mottles in chroma of 1 or 2 are in the upper 10 inches of the B horizon.

The Btx horizon has dominant color in hue of 10YR, value of 5 or 6, and chroma of 4, or it is evenly mottled in shades of brown, yellow, and gray. The Btg horizon is silt loam or silty clay loam.

The Bt horizon has hue of 10YR or 5YR, value of 5, and chroma of 6, or it is mottled in shades of gray, red, and brown. The Bt horizon is silty clay loam or silt loam.

Formation of the Soils

In this section the factors of soil formation are discussed and related to the soils in the survey area. In addition, the processes of soil formation are described.

Factors of Soil Formation

Soil is formed by weathering and other processes that act upon it. The characteristics of the soil at any given point depend upon climate, living organisms, parent material, relief, and time. Each factor acts on the soil and modifies the effect of the other four. If any of the factors is varied to a significant extent, a different soil may be formed *(3)*.

Climate and living organisms are the active forces in soil formation. Relief modifies the effects of climate and living organisms, mainly by its influence on temperature and runoff. Because climate, vegetation, parent material, and relief interact over a period of time, time is the fifth factor of soil formation. Thus, the effect of time is also reflected in the soil characteristics.

The interaction of the five factors of soil formation is more complex in some soils than in others. The five factors and how they interact to form some of the soils in Cleburne and Van Buren Counties are discussed in the following paragraphs.

Climate

The climate in Cleburne and Van Buren Counties is characterized by relatively cool winters and warm to hot summers that have adequate rainfall. The present climate probably is similar to the climate under which the soils formed. The average daily maximum temperature is about 90 degrees F during the summer and about 52 degrees F during the winter. Average annual rainfall is about 51 inches and is generally well distributed throughout the year.

The warm, moist climate in the survey area promotes rapid soil formation and encourages rapid chemical reactions. As water moves through the soil, dissolved and suspended materials move downward in the soil profile. Plant remains decompose rapidly causing the organic acid to form. This hastens the removal of carbonates and the formation of clay minerals in the soil. Because the soil is frozen only to a shallow depth and for a relatively short period, soil formation continues almost year-round. The climate throughout the survey area is relatively uniform, but its effect is modified locally by elevation and slope aspect. Climate alone does not account for differences in the soils in the survey area.

Living Organisms

Plants and animals, as well as insects, bacteria, and fungi, are important in the formation of soils. Among the effects of living organisms are the addition of organic matter and nitrogen to the soil, gains or losses in plant nutrients, and changes in soil structure and porosity.

Before Cleburne and Van Buren Counties were settled, the native vegetation had more influence on soil formation than did animal activity.

The level and nearly level areas in the broad valleys in the survey area supported a growth of tall bunchgrasses and hardwood trees. Guthrie, Leadvale, and Taft soils formed in this area. These soils, however, do not have the thick, dark surface layer commonly associated with soils that have formed under this type of vegetation. Apparently, their characteristics were influenced more by parent material, climate, and relief than by vegetation.

In the narrow valleys and along the streams in the flood plains, mixed pines and hardwoods were native on the deeper soils. Ceda, Kenn, and Spadra soils formed in these areas. These soils differ chiefly in age, relief, and degree of weathering.

The valley and ridges of the southern part of the survey area had mixed stands mainly of shortleaf pine, southern red oak, white oak, hickory, and blackgum. Soils, such as Enders, Leadvale, Linker, Nauvoo, Steprock, and Sidon soils, formed under this type of forest cover. Where bedrock is at a shallow depth, Mountainburg soil and some of the Linker and Steprock soils formed under a cover of scattered post oak and blackjack oak with an understory of tall grasses, such as big bluestem, little bluestem, and indiangrass. On the stream bottoms, where the Barling, Dela, and Spadra soils formed, the native vegetation was mainly southern red oak, cherrybark oak, water oak, and sweetgum.

The native vegetation in most of the mountainous areas consisted of a forest of upland oaks, hickory, redcedar, and shortleaf pine. Only the upper few inches of the soils in these areas have a significant accumulation of organic matter and are dark. Enders, Nella, and Steprock soils formed on these uplands. They differ chiefly in age and degree of weathering, in relief, and in the kind of parent material. Differences in native

vegetation on the uplands appear related mainly to variations in the available water.

Man is most important to the future rate and direction of soil formation. He clears the forests, cultivates the soils, and introduces new kinds of plants. He adds fertilizer, lime, and chemicals for insect, disease, and weed control. Building levees for flood control, improving drainage, grading and smoothing the surface, and controlling fire also affect the future formation of soils. Some results may not be evident for many centuries. Nevertheless, the complex of living organisms affecting soil formation in this survey area has been drastically changed by man.

Parent Material

The acid sandstones and shales that cover most of Cleburne and Van Buren Counties were deposited in marine waters during the Pennsylvanian geologic period. These sedimentary rocks are of various textures. They range from coarse-grained sandstone to fine-grained sandstone or siltstone and from sandy shale to clayey shale. Interbedding of these materials is common. There are two major formations—Atoka and Hale. The Hale Formation, which is the oldest, is made up of the Cane Hill Member, the Bloyd Shale, and the Prairie Grove Member.

The Atoka and Hale Formations are composed of interbedded shales and sandstones, and shales generally are dominant. The shales weathered into materials in which are formed such residual soils as Enders soils. Where the sandstone caps the ridges or crops out on sides of mountains or ridges, such soils as Linker, Mountainburg, or Steprock soils formed. Nella soils formed in areas where colluvium from sandstone and shale had gathered.

Such soils as Kenn and Ceda soils formed on flood plains of upland drainageways in loamy and gravelly sediments washed from local uplands. Such soils as Cane, Guthrie, Leadvale, and Taft soils formed on valley terraces in loamy material washed from local uplands. Such soils as Spadra and Dela soils formed on terraces and natural levees composed of loamy and sandy alluvium deposited by the Little Red River and other streams.

Relief

Relief, or differences in elevation, in Cleburne and Van Buren Counties is the result of the uplift of Paleozoic rocks and the subsequent erosion and entrenchment of streams and drainage channels into the land surface. The highest elevation in the survey area, about 1,962 feet above sea level, is in the northwestern corner of Van Buren County. The lowest elevation in the survey area, about 235 feet above sea level, is in the southeastern corner of Cleburne County.

Some of the greatest differences in the soils of the survey area are caused by differences in relief through its effect on drainage, runoff, erosion, and percolation of water through the soil. Relief ranges from near vertical bluffs to broad flats (fig. 16).

Generally, the steeper soils and those on narrow ridges are shallow because they have lost so much soil material through geologic erosion. An example is the Mountainburg soils. In contrast, broad areas of the nearly level or gently sloping soils have lost little soil material, and the soils are moderately deep or deep. Examples are Linker, Nauvoo, Sidon, and Enders soils.

In coves and on foot slopes are deep accumulations of material that washed or slid down from adjoining steep slopes. The Nella soils are in such areas. In places where rocks have broken off and rolled downslope, these soils are stony.

Slopes on tops and sides of ridges are shaped so that excess water is removed soon after it falls on the surface. Even when precipitation is more than sufficient, the soils are saturated for only short periods during and after rainfall or snowfall. Consequently, the soils are moderately well drained or well drained, though some are slowly permeable. This is reflected by the dominantly brown or red colors of Enders, Linker, Mountainburg, Sidon, and Steprock soils that formed on these ridges.

Slopes within the valleys generally have less gradient than on ridges. Generally, the soils in the valleys are accumulations of material washed or sloughed down from adjacent higher soils. Guthrie and Taft soils formed in this material where surface drainage was impeded, and the Leadvale soils formed in areas of more normal relief.

Spadra soils, which are on level to gently sloping stream terraces, formed in deep, loamy material washed from uplands and was redeposited on stream flood plains before the streams were further entrenched.

Kenn and Ceda soils, which are on flood plains along streams, are level to nearly level and are subject to frequent flooding.

Time

The time required for soil formation depends largely on other factors of soil formation. Less time generally is required if the climate is warm and humid and the vegetation luxuriant. If other factors are equal, less time is also required if the parent material is loamy than if it is clayey.

In terms of geological time, most of the soils of this survey area are old regardless of whether they are on mountaintops, mountainsides, or stream terraces. The younger soils formed in alluvium along streams.

The soils on the uplands in the survey area formed in material weathered from rocks of the Hale Formation and Atoka Formation of Pennsylvanian age. Most of the cations have been leached out. The reaction is strongly acid or very strongly acid. There has been considerable weathering and translocation of clay, and the argillic

Figure 16.—Relief, or a difference in elevation, in the survey area causes some of the greatest differences in the soils. Slopes range from level to gently sloping in the broad valleys to very steep on the sides of mountains and ridges.

horizon is clearly expressed. Iron, as well as clay, has translocated from the A and E horizons to the B horizon and then oxidized, causing the B horizon to have stronger red, brown, and yellow colors than the A horizon. Enders, Linker, Mountainburg, Nauvoo, Nella, Sidon, and Steprock soils clearly show the impact of time acting with other soil forming factors on parent material.

In the valleys, the Cane, Guthrie, Leadvale, and Taft soils all show the imprint of time mainly in the fragipan that developed in the middle or lower part of the subsoil. Like the adjacent higher soils, they also have been heavily leached.

Soils on the narrow flood plains of upland drainageways, mainly Ceda and Kenn soils, are younger soils formed in sediment washed from local uplands.

On the bottom lands in the valleys, below Greers Ferry Lake, the Spadra soils have been in place long enough for translocation of clay and formation of an argillic horizon. The younger Barling soils have been in place only long enough to form a cambic horizon. The much younger Dela soils on natural levees adjacent to streams exhibit few profile characteristics that show the effects of time.

Soil Horizon Differentiation

The effects of the soil-forming factors are reflected in the soil profile, which is a succession of layers, or horizons, from the surface downward and includes at least the upper part of the parent material. The parent material has been little altered by soil-forming processes. The horizons differ in one or more properties, such as color, texture, structure, consistence, porosity, or reaction.

Most soil profiles in this survey area contain 3 to 5 master horizons, or layers. The master horizons are

designated A, E, B, C, and R. Young soils commonly do not have E and B horizons.

The horizon of maximum accumulation of humified organic matter is called the A horizon, or the surface layer. The horizon of maximum leaching of dissolved or suspended materials is called the E horizon, or the subsurface layer.

The B horizon lies immediately below the E horizon and is called the subsoil *(6)*. It is the horizon of maximum accumulation of dissolved or suspended materials, such as iron and silicate clay. Commonly, the B horizon has blocky structure and is firmer than the horizon immediately above or below it.

The C horizon lies below the B horizon. It typically, has been little affected by the soil-forming processes, though it is in some places materially modified by weathering. In some young soils, the C horizon has been only slightly modified by living organisms and by weathering, and it immediately underlies the A horizon.

The R layer commonly lies below the C horizon, but it may lie immediately below an A or B horizon. It is bedrock that is sufficiently coherent when moist to make hand digging with a spade impractical.

The physical weathering of rocks, through heating and cooling and wetting and drying, slowly breaks them into small pieces that form the parent material for the residual soils. This is most evident in the Steprock soils.

In the survey area, several processes have been active in the formation of soil horizons. Among these processes are the accumulation of organic matter, the leaching of carbonates and bases, the oxidation or reduction and transfer of iron, and the formation and translocation of silicate clay minerals. In most of the soils, more than one of these processes was involved.

The accumulation of organic matter in the upper part of the profile (A horizon) is readily evident in the undisturbed areas of the Nella series. These soils have a light-colored subsurface layer from which organic matter, clay, and iron oxides have been removed.

Leaching of carbonates and bases has occurred to some degree in nearly all of the soils in the survey area. Generally, bases are leached downward in soils before silicate clay minerals begin to move. Most of the soils on the uplands in the survey area have been strongly leached.

Oxidation of iron is evident in moderately well drained and well drained soils, for example, Linker, Nella, and Steprock soils on uplands and Spadra soils on terraces. A red or brown B horizon is an indication of the oxidation of iron.

The translocation of silicate clay minerals has contributed to horizon development in most of the soils in Cleburne and Van Buren Counties. In areas where the soils are cultivated or have been cultivated, most of the eluviated E horizon has been destroyed. Where it remains, however, the E horizon has weak granular to blocky or platy structure, has less clay than the lower horizons, and is lighter in color than the rest of the soil. Clay films generally have accumulated in pores and on surfaces of peds in the B horizon. The soils were probably leached of carbonates and soluble salts to a great extent before the translocation of silicate clay occurred.

In Cleburne and Van Buren Counties, leaching of bases and translocation of silicate clay are among the most important processes of horizon differentiation in the soils.

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Glossary

ABC soil. A soil having an A, a B, and a C horizon.

AC soil. A soil having only an A and a C horizon. Commonly such soil formed in recent alluvium or on steep rocky slopes.

Aeration, soil. The exchange of air in soil with air from the atmosphere. The air in a well-aerated soil is similar to that in the atmosphere; the air in a poorly aerated soil is considerably higher in carbon dioxide and lower in oxygen.

Aggregate, soil. Many fine particles held in a single mass or cluster. Natural soil aggregates, such as granules, blocks, or prisms, are called peds. Clods are aggregates produced by tillage or logging.

Alluvium. Material, such as sand, silt, or clay, deposited on land by streams.

Area reclaim (in tables). An area difficult to reclaim after the removal of soil for construction and other uses. Revegetation and erosion control are extremely difficult.

Association, soil. A group of soils geographically associated in a characteristic repeating pattern and defined and delineated as a single map unit.

Available water capacity (available moisture capacity). The capacity of soils to hold water available for use by most plants. It is commonly defined as the difference between the amount of soil water at field moisture capacity and the amount at wilting point. It is commonly expressed as inches of water per inch of soil. The capacity, in inches, in a 60-inch profile or to a limiting layer is expressed as—

	Inches
Very low	0 to 3
Low	3 to 6
Moderate	6 to 9
High	9 to 12
Very high	more than 12

Base saturation. The degree to which material having cation-exchange properties is saturated with exchangeable bases (sum of Ca, Mg, Na, K), expressed as a percentage of the total cation-exchange capacity.

Bedding planes. Fine stratifications, less than 5 millimeters thick, in unconsolidated alluvial, eolian, lacustrine, or marine sediments.

Bedrock. The solid rock that underlies the soil and other unconsolidated material or that is exposed at the surface.

Bisequum. Two sequences of soil horizons, each of which consists of an illuvial horizon and the overlying eluvial horizons.

Bottom land. The normal flood plain of a stream, subject to flooding.

Boulders. Rock fragments larger than 2 feet (60 centimeters) in diameter.

Capillary water. Water held as a film around soil particles and in tiny spaces between particles. Surface tension is the adhesive force that holds capillary water in the soil.

Cation. An ion carrying a positive charge of electricity. The common soil cations are calcium, potassium, magnesium, sodium, and hydrogen.

Cation-exchange capacity. The total amount of exchangeable cations that can be held by the soil, expressed in terms of milliequivalents per 100 grams of soil at neutrality (pH 7.0) or at some other stated pH value. The term, as applied to soils, is synonymous with base-exchange capacity, but is more precise in meaning.

Chiseling. Tillage with an implement having one or more soil-penetrating points that shatter or loosen hard compacted layers to a depth below normal plow depth.

Clay. As a soil separate, the mineral soil particles less than 0.002 millimeter in diameter. As a soil textural class, soil material that is 40 percent or more clay, less than 45 percent sand, and less than 40 percent silt.

Clay film. A thin coating of oriented clay on the surface of a soil aggregate or lining pores or root channels. Synonyms: clay coating, clay skin.

Claypan. A slowly permeable soil horizon that contains much more clay than the horizons above it. A claypan is commonly hard when dry and plastic or stiff when wet.

Climax vegetation. The stabilized plant community on a particular site. The plant cover reproduces itself and does not change so long as the environment remains the same.

Coarse fragments. If round, mineral or rock particles 2 millimeters to 25 centimeters (10 inches) in diameter; if flat, mineral or rock particles (flagstone) 15 to 38 centimeters (6 to 15 inches) long.

Coarse textured soil. Sand or loamy sand.

Cobblestone (or cobble). A rounded or partly rounded fragment of rock 3 to 10 inches (7.5 to 25 centimeters) in diameter.

Colluvium. Soil material, rock fragments, or both moved by creep, slide, or local wash and deposited at the base of steep slopes.

Complex slope. Irregular or variable slope. Planning or constructing terraces, diversions, and other water-control measures on a complex slope is difficult.

Complex, soil. A map unit of two or more kinds of soil in such an intricate pattern or so small in area that it is not practical to map them separately at the selected scale of mapping. The pattern and proportion of the soils are somewhat similar in all areas.

Compressible (in tables). The volume of soft soil decreases excessively under load.

Concretions. Grains, pellets, or nodules of various sizes, shapes, and colors consisting of concentrated compounds or cemented soil grains. The composition of most concretions is unlike that of the surrounding soil. Calcium carbonate and iron oxide are common compounds in concretions.

Consistence, soil. The feel of the soil and the ease with which a lump can be crushed by the fingers. Terms commonly used to describe consistence are—

Loose.—Noncoherent when dry or moist; does not hold together in a mass.

Friable.—When moist, crushes easily under gentle pressure between thumb and forefinger and can be pressed together into a lump.

Firm.—When moist, crushes under moderate pressure between thumb and forefinger, but resistance is distinctly noticeable.

Plastic.—When wet, readily deformed by moderate pressure but can be pressed into a lump; will form a "wire" when rolled between thumb and forefinger.

Sticky.—When wet, adheres to other material and tends to stretch somewhat and pull apart rather than to pull free from other material.

Hard.—When dry, moderately resistant to pressure; can be broken with difficulty between thumb and forefinger.

Soft.—When dry, breaks into powder or individual grains under very slight pressure.

Cemented.—Hard; little affected by moistening.

Contour stripcropping. Growing crops in strips that follow the contour. Strips of grass or close-growing crops are alternated with strips of clean-tilled crops or summer fallow.

Control section. The part of the soil on which classification is based. The thickness varies among different kinds of soil, but for many it is that part of the soil profile between depths of 10 inches and 40 or 80 inches.

Corrosive. High risk of corrosion to uncoated steel or deterioration of concrete.

Cover crop. A close-growing crop grown primarily to improve and protect the soil between periods of regular crop production, or a crop grown between trees and vines in orchards and vineyards.

Cutbanks cave (in tables). The walls of excavations tend to cave in or slough.

Decreasers. The most heavily grazed climax range plants. Because they are the most palatable, they are the first to be destroyed by overgrazing.

Deferred grazing. Postponing grazing or resting grazingland for a prescribed period.

Dense layer (in tables). A very firm, massive layer that has a bulk density of more than 1.8 grams per cubic centimeter. Such a layer affects the ease of digging and can affect filling and compacting.

Depth to rock (in tables). Bedrock is too near the surface for the specified use.

Diversion (or diversion terrace). A ridge of earth, generally a terrace, built to protect downslope areas by diverting runoff from its natural course.

Drainage class (natural). Refers to the frequency and duration of periods of saturation or partial saturation during soil formation, as opposed to altered drainage, which is commonly the result of artificial drainage or irrigation but may be caused by the sudden deepening of channels or the blocking of drainage outlets. Seven classes of natural soil drainage are recognized:

Excessively drained.—Water is removed from the soil very rapidly. Excessively drained soils are commonly very coarse textured, rocky, or shallow. Some are steep. All are free of the mottling related to wetness.

Somewhat excessively drained.—Water is removed from the soil rapidly. Many somewhat excessively drained soils are sandy and rapidly pervious. Some are shallow. Some are so steep that much of the water they receive is lost as runoff. All are free of the mottling related to wetness.

Well drained.—Water is removed from the soil readily, but not rapidly. It is available to plants throughout most of the growing season, and wetness does not inhibit growth of roots for significant periods during most growing seasons. Well drained soils are commonly medium textured. They are mainly free of mottling.

Moderately well drained.—Water is removed from the soil somewhat slowly during some periods. Moderately well drained soils are wet for only a short time during the growing season, but periodically they are wet long enough that most mesophytic crops are affected. They commonly have a slowly pervious layer within or directly below the solum, or periodically receive high rainfall, or both.

Somewhat poorly drained.—Water is removed slowly enough that the soil is wet for significant periods

during the growing season. Wetness markedly restricts the growth of mesophytic crops unless artificial drainage is provided. Somewhat poorly drained soils commonly have a slowly pervious layer, a high water table, additional water from seepage, nearly continuous rainfall, or a combination of these.

Poorly drained.—Water is removed so slowly that the soil is saturated periodically during the growing season or remains wet for long periods. Free water is commonly at or near the surface for long enough during the growing season that most mesophytic crops cannot be grown unless the soil is artificially drained. The soil is not continuously saturated in layers directly below plow depth. Poor drainage results from a high water table, a slowly pervious layer within the profile, seepage, nearly continuous rainfall, or a combination of these.

Very poorly drained.—Water is removed from the soil so slowly that free water remains at or on the surface during most of the growing season. Unless the soil is artificially drained, most mesophytic crops cannot be grown. Very poorly drained soils are commonly level or depressed and are frequently ponded. Yet, where rainfall is high and nearly continuous, they can have moderate or high slope gradients.

Drainage, surface. Runoff, or surface flow of water, from an area.

Eluviation. The movement of material in true solution or colloidal suspension from one place to another within the soil. Soil horizons that have lost material through eluviation are eluvial; those that have received material are illuvial.

Eolian soil material. Earthy parent material accumulated through wind action; commonly refers to sandy material in dunes or to loess in blankets on the surface.

Erosion. The wearing away of the land surface by water, wind, ice, or other geologic agents and by such processes as gravitational creep.

Erosion (geologic). Erosion caused by geologic processes acting over long geologic periods and resulting in the wearing away of mountains and the building up of such landscape features as flood plains and coastal plains. Synonym: natural erosion.

Erosion (accelerated). Erosion much more rapid than geologic erosion, mainly as a result of the activities of man or other animals or of a catastrophe in nature, such as fire, that exposes the surface.

Erosion pavement. A layer of gravel or stones that remains on the surface after fine particles are removed by sheet or rill erosion.

Excess fines (in tables). Excess silt and clay are in the soil. The soil is not a source of gravel or sand for construction purposes.

Fallow. Cropland left idle in order to restore productivity through accumulation of moisture. Summer fallow is common in regions of limited rainfall where cereal grains are grown. The soil is tilled for at least one growing season for weed control and decomposition of plant residue.

Fast intake (in tables). The movement of water into the soil is rapid.

Fertility, soil. The quality that enables a soil to provide plant nutrients, in adequate amounts and in proper balance, for the growth of specified plants when light, moisture, temperature, tilth, and other growth factors are favorable.

Field moisture capacity. The moisture content of a soil, expressed as a percentage of the ovendry weight, after the gravitational, or free, water has drained away; the field moisture content 2 or 3 days after a soaking rain; also called *normal field capacity, normal moisture capacity,* or *capillary capacity.*

Fine textured soil. Sandy clay, silty clay, and clay.

First bottom. The normal flood plain of a stream, subject to frequent or occasional flooding.

Flagstone. A thin fragment of sandstone, limestone, slate, shale, or (rarely) schist, 6 to 15 inches (15 to 37.5 centimeters) long.

Flood plain. A nearly level alluvial plain that borders a stream and is subject to flooding unless protected artificially.

Foot slope. The inclined surface at the base of a hill.

Forb. Any herbaceous plant that is not a grass or a sedge.

Fragile (in tables). The soil is easily damaged by use or disturbance.

Fragipan. A loamy, brittle subsurface horizon low in porosity and content of organic matter and low or moderate in clay but high in silt or very fine sand. A fragipan appears cemented and restricts roots. When dry, it is hard or very hard and has a higher bulk density than the horizon or horizons above. When moist, it tends to rupture suddenly under pressure rather than to deform slowly.

Gleyed soil. Soil that formed under poor drainage, resulting in the reduction of iron and other elements in the profile and in gray colors and mottles.

Grassed waterway. A natural or constructed waterway, typically broad and shallow, seeded to grass as protection against erosion. Conducts surface water away from cropland.

Gravel. Rounded or angular fragments of rock up to 3 inches (2 millimeters to 7.5 centimeters) in diameter. An individual piece is a pebble.

Gravelly soil material. Material that is 15 to 50 percent, by volume, rounded or angular rock fragments, not prominently flattened, up to 3 inches (7.5 centimeters) in diameter.

Green-manure crop (agronomy). A soil-improving crop grown to be plowed under in an early stage of maturity or soon after maturity.

Ground water (geology). Water filling all the unblocked pores of underlying material below the water table.

Gully. A miniature valley with steep sides cut by running water and through which water ordinarily runs only after rainfall. The distinction between a gully and a rill is one of depth. A gully generally is an obstacle to farm machinery and is too deep to be obliterated by ordinary tillage; a rill is of lesser depth and can be smoothed over by ordinary tillage.

Hardpan. A hardened or cemented soil horizon, or layer. The soil material is sandy, loamy, or clayey and is cemented by iron oxide, silica, calcium carbonate, or other substance.

Horizon, soil. A layer of soil, approximately parallel to the surface, having distinct characteristics produced by soil-forming processes. In the identification of soil horizons, an upper case letter represents the major horizons. Numbers or lower case letters that follow represent subdivisions of the major horizons. An explanation of the subdivisions is given in the *Soil Survey Manual*. The major horizons of mineral soil are as follows:

O horizon.—An organic layer of fresh and decaying plant residue at the surface of a mineral soil.

A horizon.—The mineral horizon at or near the surface in which an accumulation of humified organic matter is mixed with the mineral material. Also, a plowed surface horizon, most of which was originally part of a B horizon.

E horizon.—The mineral horizon in which the main feature is loss of silicate clay, iron, aluminum, or some combination of these.

B horizon.—The mineral horizon below an O, A, or E horizon. The B horizon is, in part, a layer of transition from the overlying horizon to the underlying C horizon. The B horizon also has distinctive characteristics, such as accumulation of clay, sesquioxides, humus, or a combination of these; prismatic or blocky structure; redder or browner colors than those in the A horizon; or a combination of these. The combined A and B horizons are generally called the solum, or true soil. If a soil does not have a B horizon, the A horizon alone is the solum.

C horizon.—The mineral horizon or layer, excluding indurated bedrock, that is little affected by soil-forming processes and does not have the properties typical of the A or B horizon. The material of a C horizon may be either like or unlike that in which the solum formed. If the material is known to differ from that in the solum, the Arabic numeral 2 precedes the letter C.

R layer.—Consolidated rock (unweathered bedrock) beneath the soil. The rock commonly underlies a C horizon, but can be directly below an A or a B horizon.

Humus. The well decomposed, more or less stable part of the organic matter in mineral soils.

Hydrologic soil groups. Refers to soils grouped according to their runoff-producing characteristics. The chief consideration is the inherent capacity of soil bare of vegetation to permit infiltration. The slope and the kind of plant cover are not considered but are separate factors in predicting runoff. Soils are assigned to four groups. In group A are soils having a high infiltration rate when thoroughly wet and having a low runoff potential. They are mainly deep, well drained, and sandy or gravelly. In group D, at the other extreme, are soils having a very slow infiltration rate and thus a high runoff potential. They have a claypan or clay layer at or near the surface, have a permanent high water table, or are shallow over nearly impervious bedrock or other material. A soil is assigned to two hydrologic groups if part of the acreage is artificially drained and part is undrained.

Illuviation. The movement of soil material from one horizon to another in the soil profile. Generally, material is removed from an upper horizon and deposited in a lower horizon.

Impervious soil. A soil through which water, air, or roots penetrate slowly or not at all. No soil is absolutely impervious to air and water all the time.

Increasers. Species in the climax vegetation that increase in amount as the more desirable plants are reduced by close grazing. Increasers commonly are the shorter plants and the plants that are the less palatable to livestock.

Infiltration. The downward entry of water into the immediate surface of soil or other material. This contrasts with percolation, which is movement of water through soil layers or material.

Infiltration capacity. The maximum rate at which water can infiltrate into a soil under a given set of conditions.

Infiltration rate. The rate at which water penetrates the surface of the soil at any given instant, usually expressed in inches per hour. The rate can be limited by the infiltration capacity of the soil or the rate at which water is applied at the surface.

Intake rate. The average rate of water entering the soil under irrigation. Most soils have a fast initial rate; the rate decreases with application time. Therefore, intake rate for design purposes is not a constant but is a variable depending on the net irrigation application. The rate of water intake in inches per hour is expressed as follows:

Less than 0.2	very low
0.2 to 0.4	low
0.4 to 0.75	moderately low
0.75 to 1.25	moderate

1.25 to 1.75	moderately high
1.75 to 2.5	high
More than 2.5	very high

Irrigation. Application of water to soils to assist in production of crops. Methods of irrigation are—
Border.—Water is applied at the upper end of a strip in which the lateral flow of water is controlled by small earth ridges called border dikes, or borders.
Basin.—Water is applied rapidly to nearly level plains surrounded by levees or dikes.
Controlled flooding.—Water is released at intervals from closely spaced field ditches and distributed uniformly over the field.
Corrugation.—Water is applied to small, closely spaced furrows or ditches in fields of close-growing crops or in orchards so that it flows in only one direction.
Drip (or trickle).—Water is applied slowly and under low pressure to the surface of the soil or into the soil through such applicators as emitters, porous tubing, or perforated pipe.
Furrow.—Water is applied in small ditches made by cultivation implements. Furrows are used for tree and row crops.
Sprinkler.—Water is sprayed over the soil surface through pipes or nozzles from a pressure system.
Subirrigation.—Water is applied in open ditches or tile lines until the water table is raised enough to wet the soil.
Wild flooding.—Water, released at high points, is allowed to flow onto an area without controlled distribution.

Large stones (in tables). Rock fragments that are 3 inches (7.5 centimeters) or more across. Large stones adversely affect the specified use of the soil.

Leaching. The removal of soluble material from soil or other material by percolating water.

Liquid limit. The moisture content at which the soil passes from a plastic to a liquid state.

Loam. Soil material that is 7 to 27 percent clay particles, 28 to 50 percent silt particles, and less than 52 percent sand particles.

Loess. Fine grained material, dominantly of silt-sized particles, deposited by wind.

Low strength. The soil is not strong enough to support loads.

Medium textured soil. Very fine sandy loam, loam, silt loam, or silt.

Mineral soil. Soil that is mainly mineral material and low in organic material. Its bulk density is more than that of organic soil.

Minimum tillage. Only the tillage essential to crop production and prevention of soil damage.

Miscellaneous area. An area that has little or no natural soil and supports little or no vegetation.

Moderately coarse textured soil. Sandy loam and fine sandy loam.

Moderately fine textured soil. Clay loam, sandy clay loam, and silty clay loam.

Morphology, soil. The physical makeup of the soil, including the texture, structure, porosity, consistence, color, and other physical, mineral, and biological properties of the various horizons, and the thickness and arrangement of those horizons in the soil profile.

Mottling, soil. Irregular spots of different colors that vary in number and size. Mottling generally indicates poor aeration and impeded drainage. Descriptive terms are as follows: abundance—*few, common,* and *many*; size—*fine, medium,* and *coarse*; and contrast—*faint, distinct,* and *prominent.* The size measurements are of the diameter along the greatest dimension. *Fine* indicates less than 5 millimeters (about 0.2 inch); *medium*, from 5 to 15 millimeters (about 0.2 to 0.6 inch); and *coarse*, more than 15 millimeters (about 0.6 inch).

Munsell notation. A designation of color by degrees of the three simple variables—hue, value, and chroma. For example, a notation of 10YR 6/4 is a color of 10YR hue, value of 6, and chroma of 4.

Neutral soil. A soil having a pH value between 6.6 and 7.3. (See Reaction, soil.)

Nutrient, plant. Any element taken in by a plant essential to its growth. Plant nutrients are mainly nitrogen, phosphorus, potassium, calcium, magnesium, sulfur, iron, manganese, copper, boron, and zinc obtained from the soil and carbon, hydrogen, and oxygen obtained from the air and water.

Organic matter. Plant and animal residue in the soil in various stages of decomposition.

Pan. A compact, dense layer in a soil that impedes the movement of water and the growth of roots. For example, *hardpan, fragipan, claypan, plowpan,* and *traffic pan.*

Parent material. The unconsolidated organic and mineral material in which soil forms.

Ped. An individual natural soil aggregate, such as a granule, a prism, or a block.

Pedon. The smallest volume that can be called "a soil." A pedon is three dimensional and large enough to permit study of all horizons. Its area ranges from about 10 to 100 square feet (1 square meter to 10 square meters), depending on the variability of the soil.

Percolation. The downward movement of water through the soil.

Percs slowly (in tables). The slow movement of water through the soil adversely affects the specified use.

Permeability. The quality of the soil that enables water to move downward through the profile. Permeability is measured as the number of inches per hour that water moves downward through the saturated soil. Terms describing permeability are:

Very slow	less than 0.06 inch
Slow	0.06 to 0.2 inch
Moderately slow	0.2 to 0.6 inch
Moderate	0.6 inch to 2.0 inches
Moderately rapid	2.0 to 6.0 inches
Rapid	6.0 to 20 inches
Very rapid	more than 20 inches

Phase, soil. A subdivision of a soil series based on features that affect its use and management. For example, slope, stoniness, and thickness.

pH value. A numerical designation of acidity and alkalinity in soil. (See Reaction, soil.)

Piping (in tables). Subsurface tunnels or pipelike cavities are formed by water moving through the soil.

Plasticity index. The numerical difference between the liquid limit and the plastic limit; the range of moisture content within which the soil remains plastic.

Plastic limit. The moisture content at which a soil changes from semisolid to plastic.

Plowpan. A compacted layer formed in the soil directly below the plowed layer.

Ponding. Standing water on soils in closed depressions. Unless the soils are artificially drained, the water can be removed only by percolation or evapotranspiration.

Poorly graded. Refers to a coarse grained soil or soil material consisting mainly of particles of nearly the same size. Because there is little difference in size of the particles, density can be increased only slightly by compaction.

Poor filter (in tables). Because of rapid permeability, the soil may not adequately filter effluent from a waste disposal system.

Productivity, soil. The capability of a soil for producing a specified plant or sequence of plants under specific management.

Profile, soil. A vertical section of the soil extending through all its horizons and into the parent material.

Reaction, soil. A measure of the acidity or alkalinity of a soil expressed in pH values. A soil that tests to pH 7.0 is described as precisely neutral in reaction because it is neither acid nor alkaline. The degree of acidity or alkalinity is expressed as—

	pH
Extremely acid	below 4.5
Very strongly acid	4.5 to 5.0
Strongly acid	5.1 to 5.5
Medium acid	5.6 to 6.0
Slightly acid	6.1 to 6.5
Neutral	6.6 to 7.3
Mildly alkaline	7.4 to 7.8
Moderately alkaline	7.9 to 8.4
Strongly alkaline	8.5 to 9.0
Very strongly alkaline	9.1 and higher

Regolith. The unconsolidated mantle of weathered rock and soil material on the earth's surface; the loose earth material above the solid rock.

Relief. The elevations or inequalities of a land surface, considered collectively.

Residuum (residual soil material). Unconsolidated, weathered, or partly weathered mineral material that accumulated as consolidated rock disintegrated in place.

Rill. A steep sided channel resulting from accelerated erosion. A rill is generally a few inches deep and not wide enough to be an obstacle to farm machinery.

Rippable. Rippable bedrock or hardpan can be excavated using a single-tooth ripping attachment mounted on a tractor with a 200-300 draw bar horsepower rating.

Rock fragments. Rock or mineral fragments having a diameter of 2 millimeters or more; for example, pebbles, cobbles, stones, and boulders.

Rooting depth (in tables). There is a shallow root zone. The soil is shallow over a layer that greatly restricts roots.

Root zone. The part of the soil that can be penetrated by plant roots.

Runoff. The precipitation discharged into stream channels from an area. The water that flows off the surface of the land without sinking into the soil is called surface runoff. Water that enters the soil before reaching surface streams is called ground-water runoff or seepage flow from ground water.

Sand. As a soil separate, individual rock or mineral fragments from 0.05 millimeter to 2.0 millimeters in diameter. Most sand grains consist of quartz. As a soil textural class, a soil that is 85 percent or more sand and not more than 10 percent clay.

Sandstone. Sedimentary rock containing dominantly sand-size particles.

Sedimentary rock. Rock made up of particles deposited from suspension in water. The chief kinds of sedimentary rock are conglomerate, formed from gravel; sandstone, formed from sand; shale, formed from clay; and limestone, formed from soft masses of calcium carbonate. There are many intermediate types. Some wind-deposited sand is consolidated into sandstone.

Seepage (in tables). The movement of water through the soil adversely affects the specified use.

Sequum. A sequence consisting of an illuvial horizon and the overlying eluvial horizon. (See Eluviation.)

Series, soil. A group of soils that have profiles that are almost alike, except for differences in texture of the surface layer or of the underlying material. All the soils of a series have horizons that are similar in composition, thickness, and arrangement.

Shale. Sedimentary rock formed by the hardening of a clay deposit.

Sheet erosion. The removal of a fairly uniform layer of soil material from the land surface by the action of rainfall and surface runoff.

Shrink-swell. The shrinking of soil when dry and the swelling when wet. Shrinking and swelling can

damage roads, dams, building foundations, and other structures. It can also damage plant roots.

Silt. As a soil separate, individual mineral particles that range in diameter from the upper limit of clay (0.002 millimeter) to the lower limit of very fine sand (0.05 millimeter). As a soil textural class, soil that is 80 percent or more silt and less than 12 percent clay.

Siltstone. Sedimentary rock made up of dominantly silt-sized particles.

Site index. A designation of the quality of a forest site based on the height of the dominant stand at an arbitrarily chosen age. For example, if the average height attained by dominant and codominant trees in a fully stocked stand at the age of 50 years is 75 feet, the site index is 75 feet.

Slippage (in tables). The soil mass is susceptible to movement downslope when loaded, excavated, or wet.

Slope. The inclination of the land surface from the horizontal. Percentage of slope is the vertical distance divided by horizontal distance, then multiplied by 100. Thus, a slope of 20 percent is a drop of 20 feet in 100 feet of horizontal distance.

Slope (in tables). Slope is great enough that special practices are required to ensure satisfactory performance of the soil for a specific use.

Slow intake (in tables). The slow movement of water into the soil.

Small stones (in tables). Rock fragments less than 3 inches (7.5 centimeters) in diameter. Small stones adversely affect the specified use of the soil.

Soil. A natural, three-dimensional body at the earth's surface. It is capable of supporting plants and has properties resulting from the integrated effect of climate and living matter acting on earthy parent material, as conditioned by relief over periods of time.

Soil separates. Mineral particles less than 2 millimeters in equivalent diameter and ranging between specified size limits. The names and sizes of separates recognized in the United States are as follows:

	Millimeters
Very coarse sand	2.0 to 1.0
Coarse sand	1.0 to 0.5
Medium sand	0.5 to 0.25
Fine sand	0.25 to 0.10
Very fine sand	0.10 to 0.05
Silt	0.05 to 0.002
Clay	less than 0.002

Solum. The upper part of a soil profile, above the C horizon, in which the processes of soil formation are active. The solum in soil consists of the A, E, and B horizons. Generally, the characteristics of the material in these horizons are unlike those of the underlying material. The living roots and plant and animal activities are largely confined to the solum.

Stone line. A concentration of coarse fragments in a soil. Generally it is indicative of an old weathered surface. In a cross section, thickness of the line can be one fragment or more. It generally overlies material that weathered in place, and it is overlain by recent sediment of variable thickness.

Stones. Rock fragments 10 to 24 inches (25 to 60 centimeters) in diameter.

Stony. Refers to a soil containing stones in numbers that interfere with or prevent tillage.

Stripcropping. Growing crops in a systematic arrangement of strips or bands that provide vegetative barriers to wind and water erosion.

Structure, soil. The arrangement of primary soil particles into compound particles or aggregates. The principal forms of soil structure are—*platy* (laminated), *prismatic* (vertical axis of aggregates longer than horizontal), *columnar* (prisms with rounded tops), *blocky* (angular or subangular), and *granular*. *Structureless* soils are either *single grained* (each grain by itself, as in dune sand) or *massive* (the particles adhering without any regular cleavage, as in many hardpans).

Subsoil. Technically, the B horizon; roughly, the part of the solum below plow depth.

Subsoiling. Breaking up a compact subsoil by pulling a special chisel through the soil.

Substratum. The part of the soil below the solum.

Subsurface layer. Technically, the A2 horizon. Generally refers to a leached horizon lighter in color and lower in organic matter content than the overlying surface layer.

Surface layer. The soil ordinarily moved in tillage, or its equivalent in uncultivated soil, ranging in depth from 4 to 10 inches (10 to 25 centimeters). Frequently designated as the "plow layer," or the "Ap horizon."

Taxadjuncts. Soils that cannot be classified in a series recognized in the classification system. Such soils are named for a series they strongly resemble and are designated as taxadjuncts to that series because they differ in ways too small to be of consequence in interpreting their use and behavior.

Terrace. An embankment, or ridge, constructed on the contour or at a slight angle to the contour across sloping soils. The terrace intercepts surface runoff, so that water soaks into the soil or flows slowly to a prepared outlet.

Terrace (geologic). An old alluvial plain, ordinarily flat or undulating, bordering a river, a lake, or the sea.

Texture, soil. The relative proportions of sand, silt, and clay particles in a mass of soil. The basic textural classes, in order of increasing proportion of fine particles, are *sand, loamy sand, sandy loam, loam, silt loam, silt, sandy clay loam, clay loam, silty clay loam, sandy clay, silty clay,* and *clay*. The sand, loamy sand, and sandy loam classes may be further

divided by specifying "coarse," "fine," or "very fine."

Thin layer (in tables). Otherwise suitable soil material is too thin for the specified use.

Tilth, soil. The physical condition of the soil as related to tillage, seedbed preparation, seedling emergence, and root penetration.

Toe slope. The outermost inclined surface at the base of a hill; part of a foot slope.

Topsoil. The upper part of the soil, which is the most favorable material for plant growth. It is ordinarily rich in organic matter and is used to topdress roadbanks, lawns, and land affected by mining.

Trace elements. Chemical elements, such as zinc, cobalt, manganese, copper, and iron, are in soils in extremely small amounts. They are essential to plant growth.

Unstable fill (in tables). There is a risk of caving or sloughing on banks of fill material.

Upland (geology). Land at a higher elevation, in general, than the alluvial plain or stream terrace; land above the lowlands along streams.

Variegation. Refers to patterns of contrasting colors that are assumed to be inherited from the parent material rather than to be the result of poor drainage.

Weathering. All physical and chemical changes produced by atmospheric agents in rocks or other deposits at or near the earth's surface. These changes result in disintegration and decomposition of the material.

Well graded. Refers to soil material consisting of course grained particles that are well distributed over a wide range in size or diameter. Such soil normally can be easily increased in density and bearing properties by compaction. This contrasts with poorly graded soil.

Wilting point (or permanent wilting point). The moisture content of soil, on an ovendry basis, at which a plant (specifically sunflower) wilts so much that it does not recover when placed in a humid, dark chamber.

Tables

TABLE 1.--TEMPERATURE AND PRECIPITATION

[Recorded in the period 1951-80 at Greer's Ferry Dam, Arkansas]

Month	Temperature						Precipitation				
	Average daily maximum	Average daily minimum	Average daily	2 years in 10 will have-- Maximum temperature higher than--	2 years in 10 will have-- Minimum temperature lower than--	Average number of growing degree days*	Average	2 years in 10 will have-- Less than--	2 years in 10 will have-- More than--	Average number of days with 0.10 inch or more	Average snowfall
	°F	°F	°F	°F	°F	Units	In	In	In		In
January----	46.3	23.9	35.1	74	2	25	3.07	1.35	4.53	5	.9
February---	50.6	26.3	38.5	74	8	13	3.01	1.53	4.29	5	2.1
March------	60.8	36.2	48.5	84	17	132	5.40	2.83	7.65	7	.0
April------	72.5	47.2	59.9	87	28	300	5.13	2.68	7.27	7	.0
May--------	78.9	54.6	66.8	92	37	521	4.94	2.41	7.13	7	.0
June-------	86.7	63.5	75.1	98	49	753	3.94	1.87	5.72	6	.0
July-------	91.6	67.6	79.6	103	55	918	4.02	1.48	6.13	5	.0
August-----	90.1	65.2	77.7	103	54	859	4.09	2.03	5.87	6	.0
September--	82.7	59.1	70.9	97	42	627	5.13	2.37	7.50	6	.0
October----	74.3	46.3	60.3	90	30	333	3.45	1.16	5.37	4	.0
November---	61.0	37.0	49.0	83	17	93	4.61	2.14	6.72	6	.1
December---	50.9	28.5	39.7	74	8	9	4.18	2.38	5.76	6	.8
Yearly:											
Average--	70.5	46.3	58.4	---	---	---	---	---	---	---	---
Extreme--	---	---	---	104	2	---	---	---	---	---	---
Total----	---	---	---	---	---	4,583	50.97	43.02	58.60	70	3.9

*A growing degree day is a unit of heat available for plant growth. It can be calculated by adding the maximum and minimum daily temperatures, dividing the sum by 2, and subtracting the temperature below which growth is minimal for the principal crops in the area (50 °F).

TABLE 2.--FREEZE DATES IN SPRING AND FALL

[Recorded in the period 1951-80
at Greers Ferry Dam, Arkansas].

Probability	Temperature		
	24 °F or lower	28 °F or lower	32 °F or lower
Last freezing temperature in spring:			
1 year in 10 later than--	March 27	April 6	April 20
2 years in 10 later than--	March 20	April 2	April 14
5 years in 10 later than--	March 8	March 24	April 4
First freezing temperature in fall:			
1 year in 10 earlier than--	November 5	October 27	October 10
2 years in 10 earlier than--	November 10	November 1	October 16
5 years in 10 earlier than--	November 21	November 12	October 27

TABLE 3.--GROWING SEASON

[Recorded in the period 1951-80
at Greers Ferry Dam, Arkansas]

Probability	Length of growing season if daily minimum temperature is ---		
	Higher than 24 °F	Higher than 28 °F	Higher than 32 °F
	Days	Days	Days
9 years in 10	231	208	180
8 years in 10	240	217	188
5 years in 10	257	233	206
2 years in 10	275	251	224
1 year in 10	287	262	237

TABLE 4.--ACREAGE AND PROPORTIONATE EXTENT OF THE SOILS

Map symbol	Soil name	Cleburne County	Van Buren County	Total--	
				Area	Extent
		Acres	Acres	Acres	Pct
1	Barling silt loam, occasionally flooded	1,370	157	1,527	0.2
2	Cane loam, 3 to 8 percent slopes	1,401	4,448	5,849	0.7
3	Dela loamy fine sand, 0 to 2 percent slopes	1,276	0	1,276	0.2
4	Enders gravelly fine sandy loam, 3 to 8 percent slopes	7,803	12,891	20,694	2.5
5	Enders gravelly fine sandy loam, 8 to 12 percent slopes	1,400	9,445	10,845	1.3
6	Enders stony fine sandy loam, 8 to 12 percent slopes	3,652	4,109	7,761	1.0
7	Enders-Nella-Steprock complex, 8 to 20 percent slopes	14,871	40,832	55,703	6.9
8	Enders-Nella-Steprock complex, 20 to 40 percent slopes	5,107	31,318	36,425	4.5
9	Enders-Steprock complex, 8 to 20 percent slopes	34,768	46,817	81,585	10.1
10	Enders-Steprock complex, 20 to 40 percent slopes	12,629	42,925	55,554	6.9
11	Guthrie silt loam, occasionally flooded	1,296	204	1,500	0.2
12	Kenn-Ceda complex, frequently flooded	7,194	18,269	25,463	3.1
13	Leadvale silt loam, 1 to 3 percent slopes	3,885	795	4,680	0.6
14	Leadvale silt loam, 3 to 8 percent slopes	2,546	156	2,702	0.3
15	Linker fine sandy loam, 3 to 8 percent slopes	10,887	1,181	12,068	1.5
16	Linker gravelly fine sandy loam, 3 to 8 percent slopes	14,400	13,025	27,425	3.4
17	Linker gravelly fine sandy loam, 8 to 12 percent slopes	501	679	1,180	0.1
18	Linker-Mountainburg complex, 3 to 8 percent slopes	14,609	9,824	24,433	3.0
19	Linker-Mountainburg complex, 8 to 20 percent slopes	2,408	4,890	7,298	0.9
20	Mountainburg-Rock outcrop complex, 1 to 12 percent slopes	55	1,301	1,356	0.2
21	Nauvoo fine sandy loam, 3 to 8 percent slopes	3,164	6,252	9,416	1.2
22	Nella-Steprock complex, 8 to 20 percent slopes	3,473	3,309	6,782	0.8
23	Nella-Steprock complex, 20 to 40 percent slopes	1,371	6,804	8,175	1.0
24	Sidon fine sandy loam, 1 to 3 percent slopes	4,262	4,800	9,062	1.1
25	Sidon fine sandy loam, 3 to 8 percent slopes	3,948	1,404	5,352	0.7
26	Spadra loam, 0 to 1 percent slopes	592	0	592	0.1
27	Spadra loam, occasionally flooded	2,181	5,256	7,437	0.9
28	Spadra-Dela complex, 0 to 5 percent slopes	2,371	0	2,371	0.3
29	Steprock-Linker complex, 3 to 8 percent slopes	37,839	45,795	83,634	10.3
30	Steprock-Mountainburg complex, 3 to 8 percent slopes	40,186	38,993	79,179	9.8
31	Steprock-Mountainburg complex, 8 to 20 percent slopes	53,977	27,692	81,669	10.1
32	Steprock-Mountainburg-Rock outcrop complex, 40 to 60 percent slopes	33,803	53,458	87,261	10.8
33	Steprock-Nella-Mountainburg complex, 20 to 40 percent slopes	23,774	14,129	37,903	4.7
34	Taft silt loam, 0 to 2 percent slopes	1,578	1,143	2,721	0.3
	Small water*	544	1,670	2,214	0.3
	Total Land Area	355,121	453,971	809,092	100.0
	Large water**	23,701	9,472	33,173	
	Total Area	378,822	463,443	842,265	

*Enclosed areas of water less than 40 acres and streams, sloughs, and canals less than one-eighth of a mile in width.

**Enclosed areas of water 40 acres or more and streams, sloughs, and canals more than one-eighth of a mile in width.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE

[Yields are those that can be expected under a high level of management. Absence of a yield indicates that the soil is not suited to the crop or the crop generally is not grown on the soil]

Map symbol and soil name	Land capability	Soybeans	Wheat	Common bermudagrass	Improved bermudagrass	Tall fescue
		Bu	Bu	AUM*	AUM*	AUM*
1---Barling	IIw	30	40	8.0	9.0	8.0
2---Cane	IIIe	20	30	7.0	8.0	6.0
3---Dela	IIs	20	30	6.0	7.0	6.0
4---Enders	IVe	---	25	5.0	6.0	5.0
5---Enders	VIe	---	---	4.5	5.5	4.5
6---Enders	VIs	---	---	4.0	5.0	4.0
7---Enders-Nella-Steprock	VIs	---	---	4.0	5.0	4.0
8---Enders-Nella-Steprock	VIIs	---	---	---	---	---
9---Enders-Steprock	VIs	---	---	4.0	5.0	4.0
10---Enders-Steprock	VIIs	---	---	---	---	---
11---Guthrie	IVw	25	---	5.0	6.0	4.0
12---Kenn-Ceda	Vw	---	---	5.5	6.0	5.0
13---Leadvale	IIe	25	40	7.5	8.5	6.5
14---Leadvale	IIIe	20	35	7.0	8.0	6.0
15, 16---Linker	IIIe	20	30	6.0	7.0	5.0
17---Linker	IVe	---	25	5.0	6.0	4.0
18---Linker-Mountainburg	IVe	---	25	5.0	6.0	5.0
19---Linker-Mountainburg	VIe	---	---	4.0	5.0	3.0

See footnote at end of table.

TABLE 5.--LAND CAPABILITY CLASSES AND YIELDS PER ACRE OF CROPS AND PASTURE--Continued

Map symbol and soil name	Land capability	Soybeans	Wheat	Common bermudagrass	Improved bermudagrass	Tall fescue
		Bu	Bu	Bu	AUM*	AUM*
20:						
Mountainburg---	VIs	---	---	---	---	---
Rock outcrop---	VIIIs	---	---	---	---	---
21---------- Nauvoo	IIIe	20	30	7.0	8.0	7.0
22---------- Nella-Steprock	VIe	---	---	4.0	5.0	4.0
23---------- Nella-Steprock	VIIs	---	---	---	---	---
24---------- Sidon	IIe	25	40	6.5	7.5	5.5
25---------- Sidon	IIIe	20	35	6.0	7.0	5.0
26---------- Spadra	I	30	40	8.0	9.0	9.0
27---------- Spadra	IIw	30	25	7.0	8.0	8.0
28---------- Spadra-Dela	IIIe	25	35	7.0	8.0	8.0
29---------- Steprock-Linker	IIIe	---	25	5.5	6.5	5.0
30---------- Steprock-Mountainburg	IVe	---	20	5.0	6.0	4.0
31---------- Steprock-Mountainburg	VIs	---	---	3.5	4.0	3.0
32---------- Steprock-Mountainburg-Rock outcrop	VIIs	---	---	---	---	---
33---------- Steprock-Nella-Mountainburg	VIIs	---	---	---	---	---
34---------- Taft	IIIw	30	30	6.0	7.0	5.5

* Animal-unit-month: The amount of forage or feed required to feed one animal unit (one cow, one horse, one mule, five sheep, or five goats) for 30 days.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY

[Only the soils suitable for production of commercial trees are listed. Absence of an entry indicates that information was not available]

Map symbol and soil name	Woodland suitability group	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
1---------- Barling	2o7	Slight	Slight	Slight	Southern red oak----- Sweetgum---------- Eastern cottonwood--- Shortleaf pine------- Loblolly pine-------- Green ash----------	80 90 95 80 80 ---	Eastern cottonwood, American sycamore, shortleaf pine, loblolly pine, sweetgum, green ash, Shumard oak, cherrybark oak.
2---------- Cane	3o7	Slight	Slight	Slight	Sweetgum---------- Loblolly pine-------- Shortleaf pine------- Eastern cottonwood--- Green ash----------	80 80 70 --- ---	Loblolly pine, shortleaf pine.
3---------- Dela	2s8	Slight	Slight	Moderate	Southern red oak----- Sweetgum---------- Eastern cottonwood--- Shortleaf pine------- Green ash----------	80 90 100 80 ---	Loblolly pine, shortleaf pine, black walnut, southern red oak.
4, 5---------- Enders	4o1	Slight	Slight	Slight	Southern red oak----- White oak---------- Eastern redcedar----- Shortleaf pine------- Loblolly pine--------	60 55 --- --- ---	Loblolly pine, shortleaf pine, eastern redcedar.
6---------- Enders	4x2	Slight	Moderate	Slight	Southern red oak----- White oak---------- Eastern redcedar----- Shortleaf pine------- Loblolly pine--------	60 55 40 60 ---	Loblolly pine, shortleaf pine, eastern redcedar.
7*: Enders----------	4x2	Slight	Moderate	Slight	Southern red oak----- White oak---------- Eastern redcedar----- Shortleaf pine------- Loblolly pine--------	60 55 40 60 ---	Loblolly pine, shortleaf pine, eastern redcedar.
Nella----------	4x2	Slight	Moderate	Slight	Shortleaf pine------- Southern red oak----- Eastern redcedar----- Black oak---------- Loblolly pine--------	65 60 40 --- ---	Shortleaf pine, loblolly pine.
Steprock----------	4x2	Slight	Moderate	Moderate	Shortleaf pine------- Southern red oak----- White oak---------- Eastern redcedar----- Loblolly pine--------	56 45 45 35 ---	Shortleaf pine, loblolly pine, eastern redcedar.
8*: Enders----------	4x2	Moderate	Moderate	Moderate	Southern red oak----- White oak---------- Eastern redcedar----- Shortleaf pine------- Loblolly pine--------	60 55 40 60 ---	Loblolly pine, shortleaf pine, eastern redcedar.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Woodland suitability group	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
8*:							
Nella	4x2	Moderate	Moderate	Slight	Shortleaf pine Southern red oak Eastern redcedar Black oak	65 60 40 ---	Shortleaf pine, loblolly pine.
Steprock	4x2	Moderate	Moderate	Moderate	Shortleaf pine Southern red oak White oak Eastern redcedar Loblolly pine	56 45 45 35 ---	Shortleaf pine, loblolly pine, eastern redcedar.
9*:							
Enders	4x2	Slight	Moderate	Slight	Southern red oak White oak Eastern redcedar Shortleaf pine	60 55 40 60	Loblolly pine, shortleaf pine, eastern redcedar.
Steprock	4x2	Slight	Moderate	Moderate	Shortleaf pine Southern red oak White oak Eastern redcedar Loblolly pine	56 45 45 35 ---	Shortleaf pine, loblolly pine, eastern redcedar.
10*:							
Enders	4x2	Moderate	Moderate	Moderate	Southern red oak White oak Eastern redcedar Shortleaf pine	60 55 40 60	Loblolly pine, shortleaf pine, eastern redcedar.
Steprock	4x2	Moderate	Moderate	Moderate	Shortleaf pine Southern red oak White oak Eastern redcedar Loblolly pine	56 45 45 35 ---	Shortleaf pine, loblolly pine, eastern redcedar.
11 Guthrie	2w9	Slight	Severe	Severe	Loblolly pine Willow oak Sweetgum	80 85 90	Loblolly pine, sweetgum.
12*:							
Kenn	3o7	Slight	Slight	Slight	Shortleaf pine Southern red oak Sweetgum	70 70 80	Shortleaf pine, loblolly pine.
Ceda	3f8	Slight	Slight	Moderate	Shortleaf pine Southern red oak White oak Sweetgum American sycamore	70 --- --- 80 80	Loblolly pine, shortleaf pine, American sycamore, sweetgum.
13, 14 Leadvale	3o7	Slight	Slight	Slight	White oak Loblolly pine Shortleaf pine Southern red oak	70 80 70 ---	Loblolly pine, shortleaf pine.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Woodland suitability group	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
15, 16, 17--------- Linker	4o1	Slight	Slight	Slight	Shortleaf pine------- Southern red oak----- White oak------------ Eastern redcedar----- Loblolly pine--------	60 50 50 40 ---	Shortleaf pine, loblolly pine, eastern redcedar.
18*, 19*: Linker------------	4o1	Slight	Slight	Slight	Shortleaf pine------- Southern red oak----- White oak------------ Eastern redcedar----- Loblolly pine--------	60 50 50 40 ---	Shortleaf pine, loblolly pine, eastern redcedar.
Mountainburg------	5d2	Slight	Slight	Moderate	Shortleaf pine------- Eastern redcedar----- Loblolly pine--------	50 30 ---	Shortleaf pine, eastern redcedar, loblolly pine.
20*: Mountainburg------	5x3	Slight	Severe	Moderate	Shortleaf pine------- Eastern redcedar----- Loblolly pine--------	50 30 ---	Shortleaf pine, eastern redcedar, loblolly pine.
Rock outcrop.							
21---------------- Nauvoo	2o7	Slight	Slight	Slight	Loblolly pine-------- Shortleaf pine------- Sweetgum------------	89 80 90	Loblolly pine, shortleaf pine, sweetgum.
22*: Nella------------	3o1	Slight	Slight	Slight	Shortleaf pine------- Northern red oak----- Eastern redcedar-----	71 71 61	Shortleaf pine, loblolly pine.
Steprock----------	4o1	Slight	Slight	Slight	Shortleaf pine------- Southern red oak----- White oak------------ Eastern redcedar----- Loblolly pine--------	56 45 45 35 ---	Shortleaf pine, loblolly pine, eastern redcedar.
23*: Nella------------	4x2	Moderate	Moderate	Slight	Shortleaf pine------- Southern red oak----- Eastern redcedar----- Black oak------------	65 60 40 ---	Shortleaf pine, loblolly pine.
Steprock----------	4x2	Moderate	Moderate	Moderate	Shortleaf pine------- Southern red oak----- White oak------------ Eastern redcedar----- Loblolly pine--------	56 45 45 35 ---	Shortleaf pine, loblolly pine, eastern redcedar.
24, 25------------ Sidon	3o7	Slight	Slight	Slight	Southern red oak----- White oak------------ Shortleaf pine-------	--- --- ---	Loblolly pine, shortleaf pine.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Woodland suitability group	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
26, 27--- Spadra	2o7	Slight	Slight	Slight	Shortleaf pine--- Southern red oak--- Eastern redcedar---	80 80 60	Loblolly pine, shortleaf pine, black walnut, black locust, southern red oak, eastern redcedar.
28*:							
Spadra---	2o7	Slight	Slight	Slight	Shortleaf pine--- Southern red oak--- Eastern redcedar---	80 80 60	Loblolly pine, shortleaf pine, black walnut, black locust, southern red oak, eastern redcedar.
Dela---	2s8	Slight	Slight	Moderate	Southern red oak--- Sweetgum--- Eastern cottonwood--- Shortleaf pine--- Green ash---	80 90 100 80 ---	Loblolly pine, shortleaf pine, black walnut, southern red oak.
29*:							
Steprock---	4o1	Slight	Slight	Slight	Shortleaf pine--- Southern red oak--- White oak--- Eastern redcedar--- Loblolly pine---	56 45 45 35 ---	Shortleaf pine, loblolly pine, eastern redcedar.
Linker---	4o1	Slight	Slight	Slight	Shortleaf pine--- Southern red oak--- White oak--- Eastern redcedar--- Loblolly pine---	60 50 50 40 ---	Shortleaf pine, loblolly pine, eastern redcedar.
30*:							
Steprock---	4o1	Slight	Slight	Slight	Shortleaf pine--- Southern red oak--- White oak--- Eastern redcedar--- Loblolly pine---	56 45 45 35 ---	Shortleaf pine, loblolly pine, eastern redcedar.
Mountainburg---	5d2	Slight	Slight	Moderate	Shortleaf pine--- Eastern redcedar--- Loblolly pine---	50 30 ---	Shortleaf pine, eastern redcedar, loblolly pine.
31*:							
Steprock---	4x2	Slight	Moderate	Moderate	Shortleaf pine--- Southern red oak--- White oak--- Eastern redcedar--- Loblolly pine---	56 45 45 35 ---	Shortleaf pine, loblolly pine, eastern redcedar.
Mountainburg---	5x3	Moderate	Severe	Moderate	Shortleaf pine--- Eastern redcedar--- Loblolly pine---	50 30 ---	Shortleaf pine, eastern redcedar, loblolly pine.

See footnote at end of table.

TABLE 6.--WOODLAND MANAGEMENT AND PRODUCTIVITY--Continued

Map symbol and soil name	Woodland suitability group	Management concerns			Potential productivity		Trees to plant
		Erosion hazard	Equipment limitation	Seedling mortality	Common trees	Site index	
32*:							
Steprock----------	5r3	Severe	Severe	Moderate	Shortleaf pine------- Southern red oak----- White oak---------- Eastern redcedar----- Loblolly pine--------	55 45 45 35 ---	Shortleaf pine, loblolly pine, eastern redcedar.
Mountainburg------	5x3	Severe	Severe	Moderate	Shortleaf pine------- Eastern redcedar----- Loblolly pine--------	50 30 ---	Shortleaf pine, eastern redcedar, loblolly pine.
Rock outcrop.							
33*:							
Steprock----------	4x2	Moderate	Moderate	Moderate	Shortleaf pine------- Southern red oak----- White oak---------- Eastern redcedar----- Loblolly pine--------	56 45 45 35 ---	Shortleaf pine, loblolly pine, eastern redcedar.
Nella-------------	4x2	Moderate	Moderate	Slight	Shortleaf pine------- Southern red oak----- Eastern redcedar----- Black oak----------	60 60 40 ---	Shortleaf pine, loblolly pine.
Mountainburg------	5x3	Moderate	Severe	Moderate	Shortleaf pine------- Eastern redcedar----- Loblolly pine--------	50 30 ---	Shortleaf pine, eastern redcedar, loblolly pine.
34---------- Taft	3w8	Slight	Moderate	Moderate	White oak---------- Loblolly pine-------- Sweetgum---------- Shortleaf pine-------	60 85 80 60	Loblolly pine.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 7.--RECREATIONAL DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
1---------- Barling	Severe: flooding.	Moderate: wetness.	Moderate: wetness, flooding.	Slight.
2---------- Cane	Moderate: wetness.	Moderate: wetness.	Severe: slope.	Slight.
3---------- Dela	Severe: flooding.	Slight----------	Slight----------	Slight.
4---------- Enders	Severe: percs slowly.	Severe: percs slowly.	Severe: small stones, percs slowly.	Slight.
5---------- Enders	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, small stones, percs slowly.	Slight.
6---------- Enders	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, small stones, percs slowly.	Moderate: large stones.
7*: Enders----------	Severe: percs slowly.	Severe: percs slowly.	Severe: slope, small stones, percs slowly.	Moderate: large stones.
Nella----------	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.
Steprock----------	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.
8*: Enders----------	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, small stones, percs slowly.	Severe: slope.
Nella----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Steprock----------	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
9*:				
Steprock	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.
10*:				
Enders	Severe: slope, percs slowly.	Severe: slope, percs slowly.	Severe: slope, small stones, percs slowly.	Severe: slope, erodes easily.
Steprock	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
11 Guthrie	Severe: flooding, wetness.	Severe: wetness.	Severe: wetness, flooding.	Severe: wetness.
12*:				
Kenn	Severe: flooding.	Moderate: flooding.	Severe: flooding.	Moderate: flooding.
Ceda	Severe: flooding.	Moderate: small stones, flooding.	Severe: flooding, small stones.	Moderate: flooding.
13 Leadvale	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Moderate: slope, wetness, percs slowly.	Moderate: wetness.
14 Leadvale	Moderate: wetness, percs slowly.	Moderate: wetness, percs slowly.	Severe: slope.	Moderate: wetness.
15 Linker	Slight	Slight	Moderate: slope.	Slight.
16 Linker	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
17 Linker	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
18*:				
Linker	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
Mountainburg	Severe: depth to rock.	Severe: depth to rock.	Severe: small stones, depth to rock.	Slight.
19*:				
Linker	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
19*: Mountainburg	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, small stones, depth to rock.	Slight.
20*: Mountainburg	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: large stones, small stones.
Rock outcrop.				
21 Nauvoo	Slight	Slight	Severe: slope.	Slight.
22*: Nella	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
Steprock	Moderate: small stones, slope.	Moderate: slope, small stones.	Severe: slope, small stones.	Slight.
23*: Nella	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Steprock	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
24, 25 Sidon	Moderate: percs slowly, wetness.	Moderate: percs slowly, wetness.	Moderate: slope, percs slowly, wetness.	Moderate: wetness.
26 Spadra	Severe: flooding.	Slight	Slight	Slight.
27 Spadra	Severe: flooding.	Slight	Moderate: flooding.	Slight.
28*: Spadra	Severe: flooding.	Slight	Moderate: slope.	Slight.
Dela	Severe: flooding.	Slight	Slight	Slight.
29*: Steprock	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
Linker	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.

See footnote at end of table.

TABLE 7.--RECREATIONAL DEVELOPMENT--Continued

Map symbol and soil name	Camp areas	Picnic areas	Playgrounds	Paths and trails
30*:				
Steprock	Moderate: small stones.	Moderate: small stones.	Severe: small stones.	Slight.
Mountainburg	Severe: depth to rock.	Severe: depth to rock.	Severe: small stones, depth to rock.	Slight.
31*:				
Steprock	Moderate: slope, small stones.	Moderate: slope, small stones.	Severe: slope, small stones.	Moderate: large stones.
Mountainburg	Severe: small stones, depth to rock.	Severe: small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Moderate: large stones, small stones.
32*:				
Steprock	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Mountainburg	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.
Rock outcrop.				
33*:				
Steprock	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Nella	Severe: slope.	Severe: slope.	Severe: slope, small stones.	Severe: slope.
Mountainburg	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope, small stones, depth to rock.	Severe: slope.
34 Taft	Severe: wetness.	Moderate: wetness, percs slowly.	Severe: wetness.	Moderate: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 8.--WILDLIFE HABITAT

[See text for definitions of "good," "fair," "poor," and "very poor." Absence of an entry indicates that the soil was not rated]

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
1---------- Barling	Fair	Good	Good	Good	Poor	Poor	Poor	Good	Good	Poor.
2---------- Cane	Fair	Good	Good	Good	Good	Poor	Very poor.	Good	Fair	Very poor.
3---------- Dela	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Very poor.
4, 5---------- Enders	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
6---------- Enders	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
7*:										
Enders----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Nella----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Steprock----------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
8*:										
Enders----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Nella----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Steprock----------	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
9*:										
Enders----------	Poor	Fair	Good	Good	Good	Very poor.	Very poor.	Fair	Good	Very poor.
Steprock----------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
10*:										
Enders----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Steprock----------	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
11---------- Guthrie	Poor	Fair	Fair	Fair	Fair	Good	Good	Fair	Fair	Good.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
12*:										
Kenn	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Ceda	Poor	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
13--- Leadvale	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
14--- Leadvale	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
15, 16--- Linker	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
17--- Linker	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
18*:										
Linker	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
Mountainburg	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.
19*:										
Linker	Fair	Good	Good	Fair	Fair	Very poor.	Very poor.	Good	Fair	Very poor.
Mountainburg	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Very poor.	Very poor.
20*:										
Mountainburg	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.
Rock outcrop.										
21--- Nauvoo	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
22*:										
Nella	Poor	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.
Steprock	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
23*:										
Nella	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Steprock	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
24--- Sidon	Fair	Good	Good	Good	Good	Poor	Poor	Good	Good	Poor.
25--- Sidon	Fair	Good	Good	Good	Good	Very poor.	Very poor.	Good	Good	Very poor.

See footnote at end of table.

TABLE 8.--WILDLIFE HABITAT--Continued

Map symbol and soil name	Potential for habitat elements							Potential as habitat for--		
	Grain and seed crops	Grasses and legumes	Wild herbaceous plants	Hardwood trees	Coniferous plants	Wetland plants	Shallow water areas	Openland wildlife	Woodland wildlife	Wetland wildlife
26, 27---------- Spadra	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
28*: Spadra----------	Good	Good	Good	Good	Good	Poor	Very poor.	Good	Good	Very poor.
Dela----------	Good	Good	Good	Good	Good	Poor	Poor	Good	Good	Very poor.
29*: Steprock----------	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Linker----------	Fair	Good	Good	Fair	Fair	Poor	Very poor.	Good	Fair	Very poor.
30*: Steprock----------	Fair	Fair	Fair	Fair	Fair	Poor	Very poor.	Fair	Fair	Very poor.
Mountainburg------	Poor	Poor	Poor	Very poor.	Very poor.	Poor	Very poor.	Poor	Very poor.	Very poor.
31*: Steprock----------	Poor	Fair	Fair	Fair	Fair	Very poor.	Very poor.	Fair	Fair	Very poor.
Mountainburg------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.
32*: Steprock----------	Very poor.	Very poor.	Poor	Poor	Poor	Very poor.	Very poor.	Very poor.	Poor	Very poor.
Mountainburg------	Very poor.	Very poor.	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.	Very poor.
Rock outcrop.										
33*: Steprock----------	Very poor.	Poor	Fair	Fair	Fair	Very poor.	Very poor.	Poor	Fair	Very poor.
Nella----------	Very poor.	Poor	Good	Good	Good	Very poor.	Very poor.	Poor	Good	Very poor.
Mountainburg------	Very poor.	Poor	Poor	Very poor.	Very poor.	Very poor.	Very poor.	Poor	Poor	Very poor.
34---------- Taft	Fair	Good	Good	Good	Good	Fair	Fair	Good	Good	Fair.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 9.--BUILDING SITE DEVELOPMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
1---------- Barling	Severe: wetness.	Severe: flooding.	Severe: flooding, wetness.	Severe: flooding.	Severe: flooding.
2---------- Cane	Moderate: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: wetness.
3---------- Dela	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
4---------- Enders	Moderate: too clayey.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: low strength, shrink-swell.
5, 6---------- Enders	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
7*: Enders----------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
Nella----------	Moderate: large stones, slope.	Moderate: slope, large stones.	Moderate: slope, large stones.	Severe: slope.	Moderate: slope, large stones.
Steprock---------	Moderate: depth to rock, slope, large stones.	Moderate: slope, large stones.	Moderate: depth to rock, slope, large stones.	Severe: slope.	Moderate: slope, large stones.
8*: Enders----------	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.
Nella----------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Steprock---------	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
9*: Enders----------	Moderate: too clayey, slope.	Severe: shrink-swell.	Severe: shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, shrink-swell.
Steprock---------	Moderate: depth to rock, slope, large stones.	Moderate: slope, large stones.	Moderate: depth to rock, slope, large stones.	Severe: slope.	Moderate: slope, large stones.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
10*:					
Enders	Severe: slope.	Severe: shrink-swell, slope.	Severe: slope, shrink-swell.	Severe: shrink-swell, slope.	Severe: low strength, slope, shrink-swell.
Steprock	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
11					
Guthrie	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: low strength, wetness, flooding.
12*:					
Kenn	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
Ceda	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
13					
Leadvale	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.
14					
Leadvale	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness, slope.	Moderate: low strength, wetness.
15, 16					
Linker	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.
17					
Linker	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.
18*:					
Linker	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.
Mountainburg	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
19*:					
Linker	Severe: depth to rock.	Moderate: slope, depth to rock.	Severe: depth to rock.	Severe: slope.	Moderate: depth to rock, slope.
Mountainburg	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.
20*:					
Mountainburg	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.	Severe: depth to rock, large stones.
Rock outcrop.					

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
21--- Nauvoo	Slight	Slight	Slight	Moderate: slope.	Moderate: low strength.
22*:					
Nella	Moderate: slope.	Moderate: slope.	Moderate: slope.	Severe: slope.	Moderate: slope.
Steprock	Moderate: slope, depth to rock.	Moderate: slope.	Moderate: slope, depth to rock.	Severe: slope.	Moderate: slope.
23*:					
Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Steprock	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
24--- Sidon	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: wetness.	Moderate: low strength, wetness.
25--- Sidon	Severe: wetness.	Moderate: wetness.	Severe: wetness.	Moderate: slope, wetness.	Moderate: low strength, wetness.
26--- Spadra	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
27--- Spadra	Moderate: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.
28*:					
Spadra	Slight	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
Dela	Moderate: wetness.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Moderate: flooding.
29*:					
Steprock	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight.
Linker	Severe: depth to rock.	Moderate: depth to rock.	Severe: depth to rock.	Moderate: slope, depth to rock.	Moderate: depth to rock.
30*:					
Steprock	Moderate: depth to rock.	Slight	Moderate: depth to rock.	Moderate: slope.	Slight.
Mountainburg	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.
31*:					
Steprock	Moderate: depth to rock, slope, large stones.	Moderate: slope.	Moderate: depth to rock, slope.	Severe: slope.	Moderate: slope.

See footnote at end of table.

TABLE 9.--BUILDING SITE DEVELOPMENT--Continued

Map symbol and soil name	Shallow excavations	Dwellings without basements	Dwellings with basements	Small commercial buildings	Local roads and streets
31*:					
Mountainburg	Severe: depth to rock, large stones.	Severe: depth to rock.	Severe: depth to rock.	Severe: slope, depth to rock.	Severe: depth to rock.
32*:					
Steprock	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Mountainburg	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
Rock outcrop.					
33*:					
Steprock	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.
Mountainburg	Severe: depth to rock, large stones, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.	Severe: slope, depth to rock.	Severe: depth to rock, slope.
34--- Taft	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Severe: low strength.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 10.--SANITARY FACILITIES

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "good," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
1--- Barling	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Severe: flooding.	Fair: wetness.
2--- Cane	Severe: wetness, percs slowly.	Severe: slope.	Moderate: wetness.	Moderate: wetness.	Fair: wetness.
3--- Dela	Moderate: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: wetness.
4--- Enders	Severe: percs slowly.	Moderate: depth to rock, slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock.	Poor: too clayey, hard to pack.
5, 6--- Enders	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
7*:					
Enders---	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.
Nella---	Moderate: percs slowly, slope, large stones.	Severe: slope.	Moderate: slope, too clayey, large stones.	Moderate: slope.	Poor: small stones.
Steprock---	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer, small stones.
8*:					
Enders---	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Nella---	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Steprock---	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope, small stones.
9*:					
Enders---	Severe: percs slowly.	Severe: slope.	Severe: depth to rock, too clayey.	Moderate: depth to rock, slope.	Poor: too clayey, hard to pack.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
9*:					
Steprock	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer, small stones.
10*:					
Enders	Severe: percs slowly, slope.	Severe: slope.	Severe: depth to rock, slope, too clayey.	Severe: slope.	Poor: too clayey, hard to pack, slope.
Steprock	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope, small stones.
11 Guthrie	Severe: flooding, wetness, percs slowly.	Severe: wetness.	Severe: flooding, wetness.	Severe: flooding, wetness.	Poor: wetness.
12*:					
Kenn	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Poor: small stones.
Ceda	Severe: flooding, poor filter.	Severe: seepage, flooding.	Severe: flooding, seepage.	Severe: flooding, seepage.	Poor: small stones, seepage.
13, 14 Leadvale	Severe: wetness, percs slowly.	Severe: wetness.	Severe: depth to rock.	Moderate: depth to rock, wetness.	Fair: area reclaim, too clayey.
15, 16 Linker	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
17 Linker	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
18*:					
Linker	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
Mountainburg	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: area reclaim, seepage, small stones.
19*:					
Linker	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
Mountainburg	Severe: depth to rock.	Severe: slope, depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: area reclaim, seepage, small stones.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
20*: Mountainburg	Severe: depth to rock, large stones.	Severe: seepage, depth to rock, large stones.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones, thin layer.
Rock outcrop.					
21--- Nauvoo	Moderate: depth to rock, percs slowly.	Severe: slope.	Severe: depth to rock.	Slight---	Fair: area reclaim, thin layer.
22*: Nella	Moderate: percs slowly, slope.	Severe: slope.	Moderate: slope, too clayey, large stones.	Moderate: slope.	Poor: small stones.
Steprock---	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones, thin layer.
23*: Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Steprock---	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope, small stones.
24, 25--- Sidon	Severe: percs slowly, wetness.	Severe: wetness.	Severe: depth to rock.	Moderate: wetness, depth to rock.	Fair: area reclaim, too clayey.
26--- Spadra	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Good.
27--- Spadra	Severe: flooding.	Severe: flooding.	Severe: flooding.	Severe: flooding.	Good.
28*: Spadra	Moderate: flooding, percs slowly.	Severe: flooding.	Moderate: flooding.	Moderate: flooding.	Good.
Dela---	Moderate: flooding, wetness.	Severe: seepage, flooding, wetness.	Severe: seepage, wetness.	Severe: seepage, wetness.	Fair: wetness.
29*: Steprock---	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones, thin layer.

See footnote at end of table.

TABLE 10.--SANITARY FACILITIES--Continued

Map symbol and soil name	Septic tank absorption fields	Sewage lagoon areas	Trench sanitary landfill	Area sanitary landfill	Daily cover for landfill
29*:					
Linker	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer.
30*:					
Steprock	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, small stones, thin layer.
Mountainburg	Severe: depth to rock.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Severe: seepage, depth to rock.	Poor: area reclaim, seepage, small stones.
31*:					
Steprock	Severe: depth to rock.	Severe: depth to rock, slope.	Severe: depth to rock.	Severe: depth to rock.	Poor: area reclaim, thin layer, small stones.
Mountainburg	Severe: depth to rock, large stones.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage.	Severe: depth to rock, seepage.	Poor: area reclaim, small stones.
32*:					
Steprock	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope, small stones.
Mountainburg	Severe: depth to rock, slope, large stones.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
Rock outcrop.					
33*:					
Steprock	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Severe: depth to rock, slope.	Poor: area reclaim, slope, small stones.
Nella	Severe: slope.	Severe: slope.	Severe: slope.	Severe: slope.	Poor: small stones, slope.
Mountainburg	Severe: depth to rock, slope, large stones.	Severe: seepage, depth to rock, slope.	Severe: depth to rock, seepage, slope.	Severe: depth to rock, seepage, slope.	Poor: area reclaim, small stones, slope.
34--- Taft	Severe: wetness, percs slowly.	Severe: wetness.	Severe: wetness.	Severe: wetness.	Poor: wetness.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 11.--CONSTRUCTION MATERIALS

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "good," "fair," and other terms. Absence of an entry indicates that the soil was not rated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
1---------- Barling	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Good.
2---------- Cane	Fair: wetness.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer.
3---------- Dela	Good----------	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
4, 5, 6---------- Enders	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
7*: Enders----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Nella----------	Fair: large stones.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Steprock----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
8*: Enders----------	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.
Nella----------	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Steprock----------	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
9*: Enders----------	Poor: low strength, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.
Steprock----------	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
10*: Enders----------	Poor: low strength, slope, shrink-swell.	Improbable: excess fines.	Improbable: excess fines.	Poor: slope, thin layer.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
10*: Steprock	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
11 Guthrie	Poor: low strength, wetness.	Improbable: excess fines.	Improbable: excess fines.	Poor: wetness.
12*: Kenn	Fair: shrink-swell.	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
Ceda	Good	Improbable: small stones.	Probable	Poor: small stones, area reclaim.
13, 14 Leadvale	Fair: area reclaim, low strength, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: thin layer, area reclaim.
15, 16, 17 Linker	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
18*, 19*: Linker	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Mountainburg	Poor: thin layer, area reclaim.	Improbable: thin layer.	Improbable: thin layer.	Poor: small stones, area reclaim.
20*: Mountainburg	Poor: area reclaim, large stones, thin layer.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, thin layer.
Rock outcrop.				
21 Nauvoo	Fair: area reclaim, thin layer.	Improbable: excess fines.	Improbable: excess fines.	Fair: small stones, too clayey.
22*: Nella	Good	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Steprock	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
23*: Nella	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
23*:				
Steprock	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
24, 25 Sidon	Fair: thin layer, wetness, area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Fair: area reclaim, thin layer.
26, 27 Spadra	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
28*:				
Spadra	Good	Improbable: excess fines.	Improbable: excess fines.	Good.
Dela	Good	Improbable: excess fines.	Improbable: excess fines.	Fair: too sandy.
29*:				
Steprock	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Linker	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
30*:				
Steprock	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Mountainburg	Poor: thin layer, area reclaim.	Improbable: thin layer.	Improbable: thin layer.	Poor: small stones, area reclaim.
31*:				
Steprock	Poor: area reclaim.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones.
Mountainburg	Poor: area reclaim, large stones, thin layer.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones.
32*:				
Steprock	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Mountainburg	Poor: area reclaim, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
Rock outcrop.				

See footnote at end of table.

TABLE 11.--CONSTRUCTION MATERIALS--Continued

Map symbol and soil name	Roadfill	Sand	Gravel	Topsoil
33*:				
Steprock	Poor: area reclaim, slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Nella	Poor: slope.	Improbable: excess fines.	Improbable: excess fines.	Poor: small stones, slope.
Mountainburg	Poor: area reclaim, large stones, slope.	Improbable: excess fines, large stones.	Improbable: excess fines, large stones.	Poor: area reclaim, small stones, slope.
34 Taft	Poor: low strength.	Improbable: excess fines.	Improbable: excess fines.	Poor: thin layer.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 12.--WATER MANAGEMENT

[Some terms that describe restrictive soil features are defined in the Glossary. See text for definitions of "slight," "moderate," and "severe." Absence of an entry indicates that the soil was not evaluated. The information in this table indicates the dominant soil condition but does not eliminate the need for onsite investigation]

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
1---------- Barling	Moderate: seepage.	Severe: piping.	Flooding-------	Wetness, erodes easily, flooding.	Erodes easily, wetness.	Favorable.
2---------- Cane	Moderate: seepage.	Severe: piping.	Percs slowly, slope.	Wetness, percs slowly, rooting depth.	Erodes easily, wetness, rooting depth.	Erodes easily, rooting depth
3---------- Dela	Severe: seepage.	Severe: piping.	Deep to water	Fast intake----	Favorable------	Favorable.
4---------- Enders	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Percs slowly, slope.	Percs slowly.	Percs slowly.
5---------- Enders	Moderate: depth to rock.	Severe: hard to pack.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
6---------- Enders	Moderate: depth to rock.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
7*:						
Enders----------	Moderate: depth to rock.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Nella----------	Moderate: seepage.	Severe: piping.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Steprock---------	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
8*:						
Enders----------	Severe: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Nella----------	Severe: slope.	Severe: piping.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Steprock---------	Severe: slope.	Severe: piping.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
9*:						
Enders----------	Moderate: depth to rock.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Steprock---------	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
10*:						
Enders	Severe: slope.	Moderate: hard to pack.	Deep to water	Percs slowly, slope.	Slope, percs slowly.	Slope, percs slowly.
Steprock	Severe: slope.	Severe: piping.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
11--- Guthrie	Slight	Severe: piping, wetness.	Percs slowly, flooding.	Wetness, percs slowly, rooting depth.	Erodes easily, wetness, rooting depth.	Wetness, rooting depth.
12*:						
Kenn	Moderate: seepage.	Moderate: piping, large stones.	Deep to water	Droughty, erodes easily, flooding.	Large stones, erodes easily.	Large stones, droughty.
Ceda	Severe: seepage.	Severe: seepage.	Deep to water	Flooding, droughty.	Large stones	Droughty, large stones.
13--- Leadvale	Moderate: seepage, depth to rock.	Severe: piping.	Percs slowly	Wetness, percs slowly, rooting depth.	Erodes easily, wetness.	Erodes easily, rooting depth.
14--- Leadvale	Moderate: seepage, depth to rock.	Severe: piping.	Percs slowly, slope.	Wetness, percs slowly, rooting depth.	Erodes easily, wetness.	Erodes easily, rooting depth.
15, 16--- Linker	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
17--- Linker	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
18*:						
Linker	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
Mountainburg	Severe: depth to rock, seepage.	Severe: thin layer, seepage.	Deep to water	Droughty, depth to rock, slope.	Large stones, depth to rock.	Large stones, droughty, depth to rock.
19*:						
Linker	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Depth to rock, slope.	Slope, depth to rock.	Slope, depth to rock.
Mountainburg	Severe: depth to rock, seepage.	Severe: thin layer, seepage.	Deep to water	Droughty, depth to rock, slope.	Large stones, depth to rock, slope.	Large stones, slope, droughty.
20*:						
Mountainburg	Severe: depth to rock, seepage.	Severe: large stones, thin layer.	Deep to water	Slope, large stones, depth to rock.	Large stones, depth to rock.	Large stones, droughty, depth to rock.
Rock outcrop.						

See footnote at end of table.

TABLE 12.--WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
21---------- Nauvoo	Moderate: seepage, depth to rock.	Moderate: thin layer, piping.	Deep to water	Slope----------	Favorable------	Favorable.
22*:						
Nella----------	Moderate: seepage.	Severe: piping.	Deep to water	Droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Steprock---------	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Slope, depth to rock, droughty.	Slope, depth to rock, large stones.	Slope, depth to rock, droughty.
23*:						
Nella----------	Severe: slope.	Severe: piping.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Steprock---------	Severe: slope.	Severe: piping.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
24---------- Sidon	Moderate: depth to rock, seepage.	Severe: thin layer.	Percs slowly---	Percs slowly, rooting depth, wetness.	Wetness, rooting depth, erodes easily.	Percs slowly, erodes easily.
25---------- Sidon	Moderate: depth to rock, seepage.	Severe: thin layer.	Percs slowly, slope.	Slope, percs slowly, rooting depth.	Wetness, rooting depth, erodes easily.	Percs slowly, erodes easily.
26---------- Spadra	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Favorable.
27---------- Spadra	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily, flooding.	Erodes easily	Favorable.
28*:						
Spadra----------	Moderate: seepage.	Severe: piping.	Deep to water	Erodes easily	Erodes easily	Erodes easily.
Dela----------	Severe: seepage.	Severe: piping.	Deep to water	Fast intake----	Favorable------	Favorable.
29*:						
Steprock---------	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Slope, depth to rock, droughty.	Depth to rock, large stones.	Depth to rock, droughty.
Linker----------	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Depth to rock, slope.	Depth to rock	Depth to rock.
30*:						
Steprock---------	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Slope, depth to rock, droughty.	Depth to rock, large stones.	Depth to rock, droughty.

See footnote at end of table.

TABLE 12-WATER MANAGEMENT--Continued

Map symbol and soil name	Limitations for--		Features affecting--			
	Pond reservoir areas	Embankments, dikes, and levees	Drainage	Irrigation	Terraces and diversions	Grassed waterways
30*:						
Mountainburg-----	Severe: depth to rock, seepage.	Severe: thin layer, seepage.	Deep to water	Droughty, depth to rock, slope.	Large stones, depth to rock.	Large stones, droughty, depth to rock.
31*:						
Steprock---------	Moderate: seepage, depth to rock.	Severe: piping.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Mountainburg-----	Severe: depth to rock, seepage.	Severe: large stones, thin layer.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
32*:						
Steprock---------	Severe: slope.	Severe: piping.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Mountainburg-----	Severe: depth to rock, slope, seepage.	Severe: large stones, thin layer.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Rock outcrop.						
33*:						
Steprock---------	Severe: slope.	Severe: piping.	Deep to water	Droughty, depth to rock, slope.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
Nella------------	Severe: slope.	Severe: piping.	Deep to water	Large stones, droughty, slope.	Slope, large stones.	Large stones, slope, droughty.
Mountainburg-----	Severe: depth to rock, slope, seepage.	Severe: large stones, thin layer.	Deep to water	Slope, large stones, depth to rock.	Slope, large stones, depth to rock.	Large stones, slope, droughty.
34---------- Taft	Moderate: seepage.	Severe: piping.	Percs slowly---	Wetness, percs slowly, rooting depth.	Erodes easily, wetness, rooting depth.	Wetness, rooting depth.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 13.--ENGINEERING INDEX PROPERTIES

[The symbol < means less than; > means more than. Absence of an entry indicates that data were not estimated. Some soils may have Unified classifications and USDA textures in addition to those shown. In general, the dominant classifications and textures are shown.]

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
1---------- Barling	0-5	Silt loam--------	ML	A-4	0	100	100	90-100	70-90	<20	NP-3
	5-48	Silt loam, very fine sandy loam.	ML, CL-ML	A-4	0	100	100	90-100	70-90	<25	NP-6
	48-72	Silt loam, loam, very fine sandy loam.	ML, CL, CL-ML	A-4, A-6	0	100	100	90-100	70-90	<30	NP-12
2---------- Cane	0-6	Loam----------	ML, SM	A-4	0-2	80-100	75-100	65-95	40-75	<30	NP-7
	6-23	Silt loam, loam, clay loam.	ML, CL-ML, CL	A-4, A-6	0-2	90-100	80-100	75-100	60-85	17-32	3-12
	23-72	Silt loam, loam, clay loam.	ML, CL-ML, CL	A-4, A-6	0-2	90-100	80-100	75-100	55-85	18-37	3-15
3---------- Dela	0-10	Loamy fine sand	SM	A-2	0	100	98-100	90-100	15-35	---	NP
	10-21	Fine sandy loam, sandy loam, loam.	ML, CL, SM, SC	A-4	0	100	98-100	94-100	36-70	<30	NP-10
	21-72	Stratified very fine sandy loam to loamy fine sand.	ML, CL, SM, SC	A-2, A-4	0	100	98-100	90-100	15-60	<30	NP-10
4, 5---------- Enders	0-2	Gravelly fine sandy loam.	ML, SM, SM-SC, CL-ML	A-2, A-4	0-10	50-80	50-75	30-70	30-60	20-35	2-10
	2-7	Gravelly loam, gravelly fine sandy loam.	ML, SM, SM-SC, CL-ML	A-2, A-4	0-10	50-80	50-75	30-70	30-60	20-35	2-10
	7-37	Silty clay, clay	CH	A-7	0	95-100	85-100	85-100	70-95	65-80	30-40
	37-52	Silty clay, shaly silty clay.	CH	A-7	0	80-100	50-100	50-100	50-95	65-80	30-40
	52-68	Weathered bedrock	---	---	---	---	---	---	---	---	---
6---------- Enders	0-2	Stony fine sandy loam.	SM, ML, SM-SC, CL-ML	A-4, A-2	20-40	50-80	50-75	40-75	30-60	20-35	2-10
	2-7	Gravelly loam, gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-4, A-2	0-10	50-80	50-75	30-70	30-60	20-35	2-10
	7-37	Silty clay, clay	CH	A-7	0	95-100	85-100	85-100	70-95	50-65	30-40
	37-52	Silty clay, shaly silty clay.	CH	A-7	0	80-100	50-100	50-100	50-95	50-65	30-40
	52-68	Weathered bedrock	---	---	---	---	---	---	---	---	---
7*, 8*: Enders----------	0-2	Stony fine sandy loam.	SM, ML, SM-SC, CL-ML	A-4, A-2	20-40	50-80	50-75	40-75	30-60	20-35	2-10
	2-7	Gravelly loam, gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-4, A-2	0-10	50-80	50-75	30-70	30-60	20-35	2-10
	7-37	Silty clay, clay	CH	A-7	0	95-100	85-100	85-100	70-95	50-65	30-40
	37-52	Silty clay, shaly silty clay.	CH	A-7	0	80-100	50-100	50-100	50-95	50-65	30-40
	52-68	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
7*, 8*:											
Nella	0-3	Stony fine sandy loam.	ML, CL, SM SC	A-4	10-30	90-100	85-90	65-75	36-55	<30	NP-8
	3-10	Gravelly fine sandy loam.	ML, CL, GM, SM	A-4, A-2	0-10	65-90	60-75	55-65	30-55	<30	NP-8
	10-42	Gravelly clay loam, gravelly sandy clay loam.	SC, SM, CL, GC	A-4, A-6, A-7	0-10	65-90	60-75	55-70	40-65	30-55	8-27
	42-72	Very gravelly sandy clay loam, very gravelly clay loam.	GM, SM, ML, CL-ML	A-4, A-2	0-25	45-80	35-60	30-55	25-50	<25	NP-7
Steprock	0-2	Stony fine sandy loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	10-30	70-90	60-75	55-70	30-65	<20	NP-5
	2-8	Gravelly loam, gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	70-90	50-75	45-65	30-60	<20	NP-5
	8-27	Very gravelly sandy clay loam, very gravelly loam, very gravelly sandy loam.	SM, GM, ML CL-ML	A-2, A-4	5-25	45-80	40-70	40-55	30-55	<25	NP-7
	27-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
9*, 10*:											
Enders	0-2	Stony fine sandy loam.	SM, ML, SM-SC, CL-ML	A-4, A-2	20-40	50-80	50-75	40-75	30-60	20-35	2-10
	2-7	Gravelly loam, gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-4, A-2	0-10	50-80	50-75	30-70	30-60	20-35	2-10
	7-37	Silty clay, clay	CH	A-7	0	95-100	85-100	85-100	70-95	50-65	30-40
	37-52	Silty clay, shaly silty clay.	CH	A-7	0	80-100	50-100	50-100	50-95	50-65	30-40
	52-68	Weathered bedrock	---	---	---	---	---	---	---	---	---
Steprock	0-2	Stony fine sandy loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	10-30	70-90	60-75	55-70	30-65	<20	NP-5
	2-8	Gravelly loam, gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	70-90	50-75	45-65	30-60	<20	NP-5
	8-27	Very gravelly sandy clay loam, very gravelly loam, very gravelly sandy loam.	SM, GM, ML CL-ML	A-2, A-4	5-25	45-80	40-70	40-55	30-55	<25	NP-7
	27-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
11 Guthrie	0-5	Silt loam	ML, CL-ML	A-4	0	100	100	90-100	85-95	18-28	2-7
	5-27	Silt loam, silty clay loam.	ML, CL-ML, CL	A-4, A-6	0	100	100	90-100	85-95	23-39	5-15
	27-39	Silt loam, silty clay loam.	CL, CL-ML	A-4, A-6, A-7	0	90-100	85-100	80-100	70-95	20-42	5-20
	39-72	Silty clay loam, silt loam.	CL, CL-ML	A-6, A-7, A-4	0-5	85-100	80-100	75-100	66-95	20-50	4-25

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
12*:											
Kenn	0-7	Loam	ML, CL, SM SC	A-4, A-6	0	75-90	75-90	65-90	35-75	24-35	3-13
	7-31	Clay loam, gravelly sandy clay loam, gravelly clay loam.	CL, SC, GC	A-2, A-4, A-6	0-15	50-90	50-90	35-90	15-80	25-40	8-18
	31-50	Very gravelly sandy clay loam, very gravelly clay loam, cobbly sandy clay loam.	GC, GP-GC	A-2, A-4, A-6	0-35	25-50	25-50	20-50	10-45	25-40	8-18
	50-72	Cobbly loam, very gravelly loam, very gravelly fine sandy loam.	GC, GM, GP-GC, GP-GM	A-1, A-2, A-4	5-35	15-50	15-50	10-50	5-45	<31	NP-10
Ceda	0-5	Gravelly loam	SM, GM, ML GM-GC	A-1, A-2, A-4	0-10	50-80	50-75	35-65	20-65	22-29	2-7
	5-72	Very gravelly loam, very gravelly fine sandy loam, cobbly clay loam.	GM, GP-GM, GM-GC	A-1, A-2, A-4, A-6	0-30	15-50	15-50	10-50	5-45	<40	NP-18
13, 14 Leadvale	0-6	Silt loam	ML, CL-ML, CL	A-4	0	100	95-100	85-95	65-85	18-32	2-10
	6-23	Silt loam, silty clay loam.	CL-ML, CL, ML	A-4, A-6	0	100	95-100	90-98	75-90	22-36	3-14
	23-39	Silt loam, silty clay loam.	CL-ML, CL, ML	A-4, A-6, A-7	0	100	95-100	80-98	70-90	23-42	3-18
	39-51	Silty clay loam, silty clay, clay.	CL, MH, ML CH	A-6, A-7	0-5	90-100	90-100	85-95	70-90	32-58	12-26
	51-54	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
15 Linker	0-5	Fine sandy loam	SM, ML	A-4	0	85-100	80-100	70-100	40-70	<30	NP-7
	5-32	Fine sandy loam, sandy clay loam, loam.	CL, SC, SM ML	A-4, A-6	0-10	70-100	55-100	70-100	40-80	<40	NP-18
	32-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
16, 17 Linker	0-5	Gravelly fine sandy loam.	ML, GM, SM	A-2, A-4	0-5	60-90	60-75	55-70	25-70	<30	NP-7
	5-32	Fine sandy loam, sandy clay loam, loam.	CL, SC, SM ML	A-4, A-6	0-10	70-100	55-100	55-100	40-80	<40	NP-18
	32-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
18*, 19*:											
Linker----------	0-5	Gravelly fine sandy loam.	ML, GM, SM	A-2, A-4	0-5	60-90	60-75	55-70	25-70	<30	NP-7
	5-32	Fine sandy loam, sandy clay loam, loam.	CL, SC, SM ML	A-4, A-6	0-10	70-100	55-100	55-100	40-80	<40	NP-18
	32-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Mountainburg----	0-7	Gravelly fine sandy loam.	GM, SM	A-1, A-2	0-15	60-80	50-70	20-40	15-30	---	NP
	7-17	Very gravelly sandy clay loam, very gravelly sandy loam, very gravelly loam.	GM, GC, GP-GM, GM-GC	A-1, A-2	15-30	40-60	30-50	25-50	10-25	<30	NP-10
	17-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
20*:											
Mountainburg----	0-7	Stony fine sandy loam.	GM	A-1, A-2	30-50	40-70	40-60	30-50	15-25	<20	NP
	7-17	Very gravelly sandy clay loam, very stony loam, very stony fine sandy loam.	GM, GC, GM-GC	A-1, A-2	30-65	40-60	30-50	25-50	20-30	<30	NP-10
	17-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
21---------- Nauvoo	0-6	Fine sandy loam	SM-SC, CL-ML, SC CL	A-4, A-2	0-3	90-100	85-100	55-93	30-60	<30	NP-8
	6-12	Fine sandy loam, loam.	SM-SC, CL-ML, SC CL	A-4, A-2	0-3	90-100	85-100	55-95	30-60	<30	NP-8
	12-33	Loam, sandy clay loam, clay loam.	SC, CL, ML	A-4, A-6, A-7	0-3	95-100	90-100	60-95	40-80	30-50	8-24
	33-43	Fine sandy loam, loam, sandy clay loam.	SM-SC, CL-ML, SC CL	A-4, A-6	0-5	90-100	85-100	55-90	35-65	18-34	4-15
	43-60	Weathered bedrock	---	---	---	---	---	---	---	---	---
22*:											
Nella----------	0-3	Gravelly fine sandy loam.	ML, CL, GM SM	A-4, A-2	0-10	65-90	60-75	55-65	30-55	<30	NP-8
	3-10	Gravelly fine sandy loam.	ML, CL, GM, SM	A-4, A-2	0-10	65-90	60-75	55-65	30-55	<30	NP-8
	10-42	Gravelly clay loam, gravelly sandy clay loam.	SC, SM, CL, GC	A-4, A-6, A-7	0-10	65-90	60-75	55-70	40-65	30-55	8-27
	42-72	Very gravelly sandy clay loam, very gravelly clay loam.	GM, SM, ML CL-ML	A-4, A-2	0-25	45-80	35-60	30-55	25-50	<25	NP-7

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
22*:											
Steprock--------	0-2	Gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	70-90	60-75	55-75	30-65	<20	NP-5
	2-8	Gravelly loam, gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	70-90	50-75	45-65	30-60	<20	NP-5
	8-27	Very gravelly sandy clay loam, very gravelly loam, very gravelly clay loam.	GM, SM, ML CL-ML	A-4	5-35	45-80	40-70	40-65	35-65	<25	NP-7
	27-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
23*:											
Nella-----------	0-3	Stony fine sandy loam.	ML, CL, SM SC	A-4	10-30	90-100	60-75	55-65	36-55	<30	NP-8
	3-10	Gravelly fine sandy loam.	ML, CL, GM, SM	A-4, A-2	0-10	65-90	60-75	55-65	30-55	<30	NP-8
	10-42	Gravelly clay loam, gravelly sandy clay loam.	SC, SM, CL GC	A-4, A-6, A-7	0-10	65-90	60-75	55-70	40-65	30-55	8-27
	42-72	Very gravelly sandy clay loam, very gravelly clay loam.	GM, SM, ML, CL-ML	A-4, A-2	0-25	45-80	35-60	30-55	25-50	<25	NP-7
Steprock--------	0-2	Stony fine sandy loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	10-30	70-90	60-75	55-75	30-65	<20	NP-5
	2-8	Gravelly loam, gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	70-90	50-75	45-65	30-60	<20	NP-5
	8-27	Very gravelly sandy clay loam, very gravelly loam, very gravelly sandy loam.	SM, GM, ML CL-ML	A-2, A-4	5-25	45-80	40-70	40-65	30-65	<25	NP-7
	27-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
24, 25---------- Sidon	0-6	Fine sandy loam	ML, CL-ML, CL	A-4	0	90-100	70-100	65-90	65-85	15-25	2-10
	6-24	Silty clay loam, clay loam, loam.	CL-ML, CL	A-4, A-6	0	90-100	75-100	65-90	60-75	20-37	5-18
	24-39	Clay loam, loam, gravelly clay loam.	CL, SC	A-4, A-6	0	95-100	50-100	40-94	35-70	20-35	8-15
	39-48	Clay loam, sandy clay loam, gravelly clay loam.	CL, SC	A-2, A-4, A-6	0-5	80-100	45-100	35-85	25-60	20-30	8-15
	48-50	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
26, 27----------	0-6	Loam----------	ML, SM	A-2, A-4	0	90-100	90-100	65-80	30-75	<20	NP-3
Spadra	6-36	Loam, sandy clay loam.	CL, CL-ML	A-4, A-6	0	90-100	90-100	80-95	55-75	25-40	5-15
	36-72	Fine sandy loam, sandy loam, gravelly fine sandy loam.	ML, CL, SM SC	A-4, A-2, A-1	0	70-100	70-100	40-85	20-65	<30	NP-10
28*:											
Spadra----------	0-6	Loam----------	ML, SM	A-2, A-4	0	90-100	90-100	65-80	30-75	<20	NP-3
	6-36	Loam, sandy clay loam.	CL, CL-ML	A-4, A-6	0	90-100	90-100	80-95	55-75	25-40	5-15
	36-72	Fine sandy loam, sandy loam, gravelly fine sandy loam.	ML, CL, SM SC	A-4, A-2, A-1	0	70-100	70-100	40-85	20-65	<30	NP-10
Dela----------	0-10	Loamy fine sand	SM	A-2	0	100	98-100	90-100	15-35	---	NP
	10-21	Fine sandy loam, sandy loam, loam.	ML, CL, SM SC	A-4	0	100	98-100	94-100	36-70	<30	NP-10
	21-72	Stratified very fine sandy loam to loamy fine sand.	ML, CL, SM SC	A-2, A-4	0	100	98-100	90-100	15-60	<30	NP-10
29*:											
Steprock--------	0-4	Gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	70-90	60-75	55-75	30-65	<20	NP-5
	4-8	Gravelly loam, gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	70-90	50-75	45-65	30-60	<20	NP-5
	8-27	Very gravelly sandy clay loam, very gravelly loam, very gravelly clay loam.	GM, SM, ML CL-ML	A-4	5-35	45-80	40-70	40-65	35-65	<25	NP-7
	27-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
Linker----------	0-5	Gravelly fine sandy loam.	ML, GM, SM	A-2, A-4	0-5	60-90	60-75	55-75	25-70	<30	NP-7
	5-32	Fine sandy loam, sandy clay loam, loam.	CL, SC, SM ML	A-4, A-6	0-10	70-100	55-100	55-100	40-80	<40	NP-18
	32-35	Unweathered bedrock.	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Frag-ments > 3 inches	Percentage passing sieve number--				Liquid limit	Plas-ticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
30*:											
Steprock--------	0-4	Gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	70-90	60-75	55-75	30-65	<20	NP-5
	4-8	Gravelly loam, gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	70-90	50-75	45-65	30-60	<20	NP-5
	8-27	Very gravelly sandy clay loam, very gravelly loam, very gravelly clay loam.	GM, SM, ML CL-ML	A-4	5-35	45-80	40-70	40-65	35-65	<25	NP-7
	27-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
Mountainburg----	0-7	Gravelly fine sandy loam.	GM, SM	A-1, A-2	0-15	60-80	50-70	20-40	15-30	---	NP
	7-17	Very gravelly sandy clay loam, very gravelly sandy loam, very gravelly loam.	GM, GC, GP-GM, GM-GC	A-1, A-2	15-30	40-60	30-50	25-50	10-25	<30	NP-10
	17-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
31*:											
Steprock--------	0-4	Stony fine sandy loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	10-30	70-90	60-75	55-75	30-65	<20	NP-5
	4-8	Gravelly loam, gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	70-90	50-75	45-65	30-60	<20	NP-5
	8-27	Very gravelly sandy clay loam, very gravelly loam, very gravelly sandy loam.	SM, GM, ML CL-ML	A-2, A-4	5-25	45-80	40-70	40-65	30-65	<25	NP-7
	27-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
Mountainburg----	0-7	Stony fine sandy loam.	GM	A-1, A-2	30-50	40-70	40-60	30-50	15-25	<20	NP
	7-17	Very gravelly sandy clay loam, very stony loam, very stony fine sandy loam.	GM, GC, GM-GC	A-1, A-2	30-65	40-60	30-50	25-50	20-30	<30	NP-10
	17-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
32*:											
Steprock--------	0-2	Stony fine sandy loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	10-30	70-90	60-75	55-75	30-65	<20	NP-5
	2-8	Gravelly loam, gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	70-90	50-75	45-65	30-60	<20	NP-5
	8-27	Very gravelly sandy clay loam, very gravelly loam, very gravelly sandy loam.	SM, GM, ML CL-ML	A-2, A-4	5-25	45-80	40-70	40-65	30-65	<25	NP-7
	27-46	Weathered bedrock	---	---	---	---	---	---	---	---	---

See footnote at end of table.

TABLE 13.--ENGINEERING INDEX PROPERTIES--Continued

Map symbol and soil name	Depth	USDA texture	Classification		Fragments > 3 inches	Percentage passing sieve number--				Liquid limit	Plasticity index
			Unified	AASHTO		4	10	40	200		
	In				Pct					Pct	
32*:											
Mountainburg----	0-7	Stony fine sandy loam.	GM	A-1, A-2	30-50	40-70	40-60	30-50	15-25	<20	NP
	7-17	Very gravelly sandy clay loam, very stony loam, very stony fine sandy loam.	GM, GC, GM-GC	A-1, A-2	30-65	40-60	30-50	25-50	20-30	<30	NP-10
	17-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
Rock outcrop.											
33*:											
Steprock--------	0-2	Stony fine sandy loam.	SM, SM-SC, ML, CL-ML	A-2, A-4	10-30	70-90	60-75	55-75	30-65	<20	NP-5
	2-8	Gravelly loam, gravelly fine sandy loam.	SM, ML, SM-SC, CL-ML	A-2, A-4	0-10	70-90	50-75	45-65	30-60	<20	NP-5
	8-27	Very gravelly sandy clay loam, very gravelly loam, very gravelly sandy loam.	SM, GM, ML CL-ML	A-2, A-4	5-25	45-80	40-70	40-65	30-65	<25	NP-7
	27-46	Weathered bedrock	---	---	---	---	---	---	---	---	---
Nella----------	0-3	Stony fine sandy loam.	ML, CL, SM SC	A-4	10-30	90-100	60-75	55-65	36-55	<30	NP-8
	3-10	Gravelly fine sandy loam.	ML, CL, GM, SM	A-4, A-6	0-10	65-90	60-75	55-65	30-55	<30	NP-8
	10-42	Gravelly clay loam, gravelly sandy clay loam.	SC, SM, CL, GC	A-4, A-6, A-7	0-10	65-90	60-75	55-70	40-65	30-55	8-27
	42-72	Very gravelly sandy clay loam, very gravelly clay loam.	GM, SM, ML, CL-ML	A-4, A-2	0-25	45-80	35-60	30-55	25-50	<25	NP-7
Mountainburg----	0-7	Stony fine sandy loam.	GM	A-1, A-2	30-50	40-70	40-60	30-50	15-25	<20	NP
	7-17	Very gravelly sandy clay loam, very stony loam, very stony fine sandy loam.	GM, GC, GM-GC	A-1, A-2	30-65	40-60	30-50	25-50	20-30	<30	NP-10
	17-20	Unweathered bedrock.	---	---	---	---	---	---	---	---	---
34----------	0-10	Silt loam--------	CL-ML, ML	A-4	0	100	95-100	90-100	75-95	18-30	2-10
Taft	10-23	Silt loam, silty clay loam	CL-ML, CL	A-4, A-6	0	100	95-100	95-100	85-95	23-38	5-16
	23-57	Silt loam, silty clay loam.	CL-ML, CL	A-4, A-6, A-7	0	95-100	90-100	85-100	80-95	23-42	5-20
	57-72	Silty clay loam, silt loam.	ML, CL, CL-ML	A-6, A-4	0	90-100	80-100	70-90	50-85	35-48	12-22

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS

[The symbol < means less than; > means more than. Entries under "Erosion factors--T" apply to the entire profile. Entries under "Organic matter" apply only to the surface layer. Absence of an entry indicates that data were not available or were not estimated]

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm	In/hr	In/in	pH				Pct
1----------	0-5	8-17	1.25-1.60	0.6-2.0	0.13-0.24	5.1-6.5	Low----------	0.37	5	1-3
Barling	5-48	10-17	1.25-1.55	0.6-2.0	0.13-0.24	4.5-6.5	Low----------	0.37		
	48-72	12-24	1.25-1.60	0.6-2.0	0.15-0.24	4.5-6.5	Low----------	0.37		
2----------	0-6	7-18	1.45-1.65	0.6-2.0	0.10-0.18	4.5-6.0	Low----------	0.28	3	.5-1
Cane	6-23	18-35	1.55-1.75	0.6-2.0	0.14-0.19	4.5-6.0	Low----------	0.37		
	23-72	18-35	1.60-1.80	0.06-0.2	0.05-0.08	4.5-6.0	Low----------	0.37		
3----------	0-10	5-10	1.35-1.50	2.0-6.0	0.07-0.11	4.5-6.0	Low----------	0.17	5	.5-1
Dela	10-21	5-18	1.50-1.70	2.0-6.0	0.10-0.20	4.5-6.0	Low----------	0.32		
	21-72	5-18	1.50-1.70	2.0-6.0	0.07-0.15	4.5-6.0	Low----------	0.20		
4, 5----------	0-7	10-25	1.25-1.60	0.6-2.0	0.07-0.15	3.6-5.5	Low----------	0.32	3	1-4
Enders	7-37	35-60	1.15-1.45	<0.06	0.12-0.18	3.6-5.5	High---------	0.24		
	37-52	35-60	1.20-1.45	<0.06	0.08-0.10	3.6-5.5	Moderate-----	0.24		
	52-68	---	---	---	---	---	----------	----		
6----------	0-7	10-25	1.25-1.60	0.6-2.0	0.15-0.22	3.6-5.5	Low----------	0.32	3	1-4
Enders	7-37	35-60	1.15-1.45	<0.06	0.09-0.13	3.6-5.5	High---------	0.24		
	37-52	35-60	1.25-1.45	<0.06	0.11-0.13	3.6-5.5	Moderate-----	0.24		
	52-68	---	---	---	---	---	----------	----		
7*, 8*:										
Enders----------	0-7	10-25	1.25-1.60	0.6-2.0	0.15-0.22	3.6-5.5	Low----------	0.32	3	1-4
	7-37	35-60	1.15-1.45	<0.06	0.09-0.13	3.6-5.5	High---------	0.24		
	37-52	35-60	1.25-1.45	<0.06	0.11-0.13	3.6-5.5	Moderate-----	0.24		
	52-68	---	---	---	---	---	----------	----		
Nella----------	0-10	12-25	1.30-1.45	2.0-6.0	0.08-0.15	4.5-5.5	Low----------	0.15	5	.5-3
	10-72	27-45	1.35-1.55	0.6-2.0	0.08-0.15	4.5-5.5	Low----------	0.15		
Steprock--------	0-8	8-18	1.30-1.60	2.0-6.0	0.08-0.12	4.5-5.5	Low----------	0.20	3	.5-3
	8-27	10-35	1.30-1.60	0.6-2.0	0.06-0.10	4.5-5.5	Low----------	0.17		
	27-46	---	---	---	---	---	----------	----		
9*, 10*:										
Enders----------	0-7	10-25	1.25-1.60	0.6-2.0	0.15-0.22	3.6-5.5	Low----------	0.32	3	1-4
	7-37	35-60	1.15-1.45	<0.06	0.09-0.13	3.6-5.5	High---------	0.24		
	37-52	35-60	1.25-1.45	<0.06	0.11-0.13	3.6-5.5	Moderate-----	0.24		
	52-68	---	---	---	---	---	----------	----		
Steprock--------	0-8	8-18	1.30-1.60	2.0-6.0	0.08-0.12	4.5-5.5	Low----------	0.20	3	.5-3
	8-27	10-35	1.30-1.60	0.6-2.0	0.06-0.10	4.5-5.5	Low----------	0.17		
	27-46	---	---	---	---	---	----------	----		
11----------	0-5	10-25	1.35-1.55	0.6-2.0	0.20-0.22	3.6-5.0	Low----------	0.43	3	1-4
Guthrie	5-27	18-30	1.40-1.60	0.6-2.0	0.18-0.20	3.6-5.0	Low----------	0.43		
	27-39	18-32	1.60-1.75	0.06-0.2	0.03-0.05	3.6-5.0	Low----------	0.43		
	39-72	18-35	1.60-1.75	0.06-0.2	0.03-0.05	3.6-5.0	Low----------	0.43		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm	In/hr	In/in	pH				Pct
12*:										
Kenn	0-7	10-25	1.30-1.55	0.6-2.0	0.10-0.18	5.1-6.5	Low	0.37	5	.5-2
	7-31	20-30	1.45-1.70	0.6-2.0	0.06-0.18	4.5-5.5	Low	0.28		
	31-50	20-30	1.45-1.70	0.6-2.0	0.02-0.10	4.5-5.5	Low	0.28		
	50-72	10-25	1.40-1.70	0.6-2.0	0.02-0.05	4.5-5.5	Low	0.32		
Ceda	0-5	10-18	1.30-1.55	6.0-20	0.07-0.17	5.6-6.5	Low	0.28	5	.5-1
	5-72	15-32	1.40-1.70	6.0-20	0.02-0.16	5.6-6.5	Low	0.28		
13, 14	0-6	12-22	1.30-1.40	0.6-2.0	0.17-0.22	4.5-5.5	Low	0.43	3	.5-3
Leadvale	6-23	20-32	1.30-1.50	0.6-2.0	0.17-0.20	4.5-5.5	Low	0.43		
	23-39	20-35	1.55-1.70	0.06-0.6	0.06-0.11	4.5-5.5	Low	0.43		
	39-51	30-45	1.40-1.60	0.06-0.6	0.06-0.11	4.5-5.5	Low	0.24		
	51-54	---	---	---	---	---	---	---		
15	0-5	5-20	1.30-1.60	0.6-2.0	0.11-0.20	3.6-5.5	Low	0.28	3	.5-3
Linker	5-32	18-35	1.30-1.60	0.6-2.0	0.11-0.20	3.6-5.5	Low	0.32		
	32-35	---	---	---	---	---	---	---		
16, 17	0-5	5-20	1.30-1.60	0.6-2.0	0.11-0.17	3.6-5.5	Low	0.24	3	.5-3
Linker	5-32	18-35	1.30-1.60	0.6-2.0	0.11-0.20	3.6-5.5	Low	0.32		
	32-35	---	---	---	---	---	---	---		
18*, 19*:										
Linker	0-5	5-20	1.30-1.60	0.6-2.0	0.11-0.17	3.6-5.5	Low	0.24	3	.5-3
	5-32	18-35	1.30-1.60	0.6-2.0	0.11-0.20	3.6-5.5	Low	0.32		
	32-35	---	---	---	---	---	---	---		
Mountainburg	0-7	3-10	1.40-1.60	2.0-6.0	0.05-0.10	4.5-6.0	Low	0.20	1	.5-3
	7-17	15-25	1.50-1.70	2.0-6.0	0.05-0.10	4.5-5.5	Low	0.17		
	17-20	---	---	---	---	---	---	---		
20*:										
Mountainburg	0-7	4-12	1.30-1.60	2.0-6.0	0.05-0.10	4.5-6.0	Low	0.17	1	1-4
	7-17	10-18	1.30-1.60	2.0-6.0	0.05-0.10	4.5-5.5	Low	0.24		
	17-20	---	---	---	---	---	---	---		
Rock outcrop.										
21	0-12	10-25	1.30-1.60	2.0-6.0	0.13-0.17	4.5-6.0	Low	0.28	3	.5-2
Nauvoo	12-33	18-35	1.30-1.60	0.6-2.0	0.14-0.20	4.5-6.0	Low	0.32		
	33-43	15-30	1.30-1.60	0.6-2.0	0.11-0.17	4.5-6.0	Low	0.32		
	43-60	---	---	---	---	---	---	---		
22*:										
Nella	0-10	12-25	1.30-1.45	2.0-6.0	0.08-0.15	4.5-5.5	Low	0.15	5	.5-3
	10-72	27-45	1.30-1.45	0.6-2.0	0.07-0.14	4.5-5.5	Low	0.15		
Steprock	0-8	8-18	1.30-1.60	2.0-6.0	0.08-0.15	4.5-5.5	Low	0.20	3	.5-3
	8-27	10-35	1.30-1.60	0.6-2.0	0.06-0.10	4.5-5.5	Low	0.17		
	27-46	---	---	---	---	---	---	---		
23*:										
Nella	0-10	12-25	1.30-1.45	2.0-6.0	0.08-0.15	4.5-5.5	Low	0.15	5	.5-3
	10-72	27-45	1.35-1.55	0.6-2.0	0.08-0.15	4.5-5.5	Low	0.15		
Steprock	0-8	8-18	1.30-1.60	2.0-6.0	0.08-0.12	4.5-5.5	Low	0.20	3	.5-3
	8-27	10-35	1.30-1.60	0.6-2.0	0.06-0.10	4.5-5.5	Low	0.17		
	27-46	---	---	---	---	---	---	---		

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm	In/hr	In/in	pH				Pct
24, 25----------	0-6	8-25	1.20-1.40	0.6-2.0	0.13-0.24	3.6-5.5	Low----------	0.43	3	.5-2
Sidon	6-24	18-35	1.20-1.40	0.6-2.0	0.15-0.24	3.6-5.5	Low----------	0.43		
	24-39	18-40	1.40-1.60	0.06-0.6	0.08-0.15	3.6-5.5	Low----------	0.37		
	39-48	18-35	1.30-1.60	0.06-0.6	0.12-0.20	3.6-5.5	Low----------	0.32		
	48-50	---	---	---	---	---	----------	----		
26, 27----------	0-6	10-26	1.30-1.60	0.6-2.0	0.11-0.24	4.5-6.0	Low----------	0.37	5	.5-3
Spadra	6-36	18-32	1.30-1.60	0.6-2.0	0.12-0.20	4.5-6.0	Low----------	0.37		
	36-72	15-25	1.30-1.60	0.6-2.0	0.10-0.15	4.5-6.0	Low----------	0.24		
28*:										
Spadra----------	0-6	10-26	1.30-1.60	0.6-2.0	0.11-0.24	4.5-6.0	Low----------	0.37	5	.5-3
	6-36	18-32	1.30-1.60	0.6-2.0	0.12-0.20	4.5-6.0	Low----------	0.37		
	36-72	15-25	1.30-1.60	0.6-2.0	0.10-0.15	4.5-6.0	Low----------	0.24		
Dela----------	0-10	5-10	1.35-1.50	2.0-6.0	0.07-0.11	4.5-6.0	Low----------	0.17	5	.5-1
	10-21	5-18	1.50-1.70	2.0-6.0	0.10-0.20	4.5-6.0	Low----------	0.32		
	21-72	5-18	1.50-1.70	2.0-6.0	0.07-0.15	4.5-6.0	Low----------	0.20		
29*:										
Steprock--------	0-8	8-18	1.30-1.60	2.0-6.0	0.08-0.15	4.5-5.5	Low----------	0.20	3	.5-3
	8-27	10-35	1.30-1.60	0.6-2.0	0.06-0.10	4.5-5.5	Low----------	0.17		
	27-46	---	---	---	---	---	----------	----		
Linker----------	0-5	5-20	1.30-1.60	0.6-2.0	0.11-0.17	3.6-5.5	Low----------	0.24	3	.5-3
	5-32	18-35	1.30-1.60	0.6-2.0	0.11-0.20	3.6-5.5	Low----------	0.32		
	32-35	---	---	---	---	---	----------	----		
30*:										
Steprock--------	0-8	8-18	1.30-1.60	2.0-6.0	0.08-0.15	4.5-5.5	Low----------	0.20	3	.5-3
	8-27	10-35	1.30-1.60	0.6-2.0	0.06-0.10	4.5-5.5	Low----------	0.17		
	27-46	---	---	---	---	---	----------	----		
Mountainburg----	0-7	3-10	1.40-1.60	2.0-6.0	0.05-0.10	4.5-6.0	Low----------	0.20	1	.5-3
	7-17	15-25	1.50-1.70	2.0-6.0	0.05-0.10	4.5-5.5	Low----------	0.17		
	17-20	---	---	---	---	---	----------	----		
31*:										
Steprock--------	0-8	8-18	1.30-1.60	2.0-6.0	0.08-0.12	4.5-5.5	Low----------	0.20	3	.5-3
	8-27	10-35	1.30-1.60	0.6-2.0	0.06-0.10	4.5-5.5	Low----------	0.17		
	27-46	---	---	---	---	---	----------	----		
Mountainburg----	0-7	4-12	1.30-1.60	2.0-6.0	0.05-0.10	4.5-6.0	Low----------	0.17	1	1-4
	7-17	10-18	1.30-1.60	2.0-6.0	0.05-0.10	4.5-5.5	Low----------	0.24		
	17-20	---	---	---	---	---	----------	----		
32*:										
Steprock--------	0-8	8-18	1.30-1.60	2.0-6.0	0.08-0.12	4.5-5.5	Low----------	0.20	3	.5-3
	8-27	10-35	1.30-1.60	0.6-2.0	0.06-0.10	4.5-5.5	Low----------	0.17		
	27-46	---	---	---	---	---	----------	----		
Mountainburg----	0-7	4-12	1.30-1.60	2.0-6.0	0.05-0.10	4.5-6.0	Low----------	0.17	1	1-4
	7-17	10-18	1.30-1.60	2.0-6.0	0.05-0.10	4.5-5.5	Low----------	0.24		
	17-20	---	---	---	---	---	----------	----		
Rock outcrop.										

See footnote at end of table.

TABLE 14.--PHYSICAL AND CHEMICAL PROPERTIES OF THE SOILS--Continued

Map symbol and soil name	Depth	Clay	Moist bulk density	Permeability	Available water capacity	Soil reaction	Shrink-swell potential	Erosion factors		Organic matter
								K	T	
	In	Pct	G/cm	In/hr	In/in	pH				Pct
33*:										
Steprock--------	0-8	8-18	1.30-1.60	2.0-6.0	0.08-0.12	4.5-5.5	Low----------	0.20	3	.5-3
	8-27	10-35	1.30-1.60	0.6-2.0	0.06-0.10	4.5-5.5	Low----------	0.17		
	27-46	---	---	---	---	---	----------	----		
Nella-----------	0-10	12-25	1.30-1.45	2.0-6.0	0.08-0.15	4.5-5.5	Low----------	0.15	5	.5-3
	10-72	27-45	1.35-1.55	0.6-2.0	0.08-0.15	4.5-5.5	Low----------	0.15		
Mountainburg----	0-7	4-12	1.30-1.60	2.0-6.0	0.05-0.10	4.5-6.0	Low----------	0.17	1	1-4
	7-17	10-18	1.30-1.60	2.0-6.0	0.05-0.10	4.5-5.5	Low----------	0.24		
	17-20	---	---	---	---	---	----------	----		
34---------------	0-10	10-25	1.30-1.40	0.6-2.0	0.20-0.22	4.5-5.5	Low----------	0.43	3	.5-2
Taft	10-23	18-35	1.30-1.50	0.6-2.0	0.18-0.20	4.5-5.5	Low----------	0.43		
	23-57	15-35	1.50-1.65	0.06-0.2	0.03-0.07	4.5-5.5	Low----------	0.43		
	57-72	8-45	1.35-1.60	0.2-0.6	0.01-0.03	4.5-5.5	Low----------	0.37		

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 15.--SOIL AND WATER FEATURES

["Flooding" and "water table" and terms such as "rare," "brief," "apparent," and "perched" are explained in the text. The symbol < means less than; > means more than. Absence of an entry indicates that the feature is not a concern or that data were not estimated]

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
1----- Barling	C	Occasional	Very brief to brief.	Dec-Apr	1.0-4.0	Perched	Dec-Apr	>60	---	Moderate	Moderate.
2----- Cane	C	None-----	---	---	2.0-3.0	Perched	Nov-Mar	>60	---	Moderate	High.
3----- Dela	B	Rare-----	---	---	4.0-6.0	Apparent	Nov-Jul	>60	---	Moderate	Moderate.
4, 5, 6----- Enders	C	None-----	---	---	>6.0	---	---	40-60	Soft	High-----	High.
7*, 8*:											
Enders-----	C	None-----	---	---	>6.0	---	---	40-60	Soft	High-----	High.
Nella-----	B	None-----	---	---	>6.0	---	---	>60	---	Low------	Moderate.
Steprock---	B	None-----	---	---	>6.0	---	---	20-40	Soft	Low------	High.
9*, 10*:											
Enders-----	C	None-----	---	---	>6.0	---	---	40-60	Soft	High-----	High.
Steprock---	B	None-----	---	---	>6.0	---	---	20-40	Soft	Low------	High.
11----- Guthrie	D	Occasional	Brief-----	Jan-Apr	0.5-1.0	Perched	Jan-Apr	>60	---	High-----	High.
12*:											
Kenn-----	B	Frequent----	Very brief	Jan-Jul	>6.0	---	---	>60	---	Moderate	Moderate.
Ceda-----	B	Frequent----	Very brief	Jan-Jul	>6.0	---	---	>60	---	Low------	Moderate.
13, 14----- Leadvale	C	None-----	---	---	2.0-3.0	Perched	Jan-Apr	>48	Soft	Moderate	Moderate.
15, 16, 17--- Linker	B	None-----	---	---	>6.0	---	---	20-40	Hard	Low------	High.
18*, 19*:											
Linker-----	B	None-----	---	---	>6.0	---	---	20-40	Hard	Low------	High.
Mountainburg---	D	None-----	---	---	>6.0	---	---	12-20	Hard	Low------	High.
20*:											
Mountainburg---	D	None-----	---	---	>6.0	---	---	12-20	Hard	Low------	Moderate.
Rock outcrop.											
21----- Nauvoo	B	None-----	---	---	>6.0	---	---	40-60	Soft	Low------	High.
22*:											
Nella-----	B	None-----	---	---	>6.0	---	---	>60	---	Moderate	Moderate.
Steprock---	B	None-----	---	---	>6.0	---	---	20-40	Soft	Low------	High.

See footnote at end of table.

TABLE 15.--SOIL AND WATER FEATURES--Continued

Map symbol and soil name	Hydrologic group	Flooding			High water table			Bedrock		Risk of corrosion	
		Frequency	Duration	Months	Depth	Kind	Months	Depth	Hardness	Uncoated steel	Concrete
					Ft			In			
23*:											
Nella	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate.
Steprock	B	None	---	---	>6.0	---	---	20-40	Soft	Low	High.
24, 25--Sidon	C	None	---	---	2.0-3.0	Perched	Jan-Apr	40-60	Hard	Moderate	Moderate.
26--Spadra	B	Rare	---	---	>6.0	---	---	>60	---	Low	High.
27--Spadra	B	Occasional	Very brief to brief.	Dec-Apr	>6.0	---	---	>60	---	Low	High.
28*:											
Spadra	B	Rare	---	---	>6.0	---	---	>60	---	Low	High.
Dela	B	Rare	---	---	3.0-5.0	Apparent	Nov-Jul	>60	---	Moderate	Moderate.
29*:											
Steprock	B	None	---	---	>6.0	---	---	20-40	Soft	Low	High.
Linker	B	None	---	---	>6.0	---	---	20-40	Hard	Low	High.
30*:											
Steprock	B	None	---	---	>6.0	---	---	20-40	Soft	Low	High.
Mountainburg	D	None	---	---	>6.0	---	---	12-20	Hard	Low	High.
31*:											
Steprock	B	None	---	---	>6.0	---	---	20-40	Soft	Low	High.
Mountainburg	D	None	---	---	>6.0	---	---	12-20	Hard	Low	Moderate.
32*:											
Steprock	B	None	---	---	>6.0	---	---	20-40	Soft	Low	High.
Mountainburg	D	None	---	---	>6.0	---	---	12-20	Hard	Low	Moderate.
Rock outcrop.											
33*:											
Steprock	B	None	---	---	>6.0	---	---	20-40	Soft	Low	High.
Nella	B	None	---	---	>6.0	---	---	>60	---	Low	Moderate.
Mountainburg	D	None	---	---	>6.0	---	---	12-20	Hard	Low	Moderate.
34--Taft	C	None	---	---	1.0-2.0	Perched	Jan-Apr	>60	---	High	High.

* See description of the map unit for composition and behavior characteristics of the map unit.

TABLE 16.--CLASSIFICATION OF THE SOILS

Soil name	Family or higher taxonomic class
Barling	Coarse-silty, mixed, thermic Fluvaquentic Dystrochrepts
Cane	Fine-loamy, siliceous, thermic Typic Fragiudults
Ceda	Loamy-skeletal, siliceous, nonacid, thermic Typic Udifluvents
Dela	Coarse-loamy, siliceous, nonacid, thermic Typic Udifluvents
Enders	Clayey, mixed, thermic Typic Hapludults
Guthrie	Fine-silty, siliceous, thermic Typic Fragiaquults
Kenn	Fine-loamy, siliceous, thermic Ultic Hapludalfs
Leadvale	Fine-silty, siliceous, thermic Typic Fragiudults
Linker	Fine-loamy, siliceous, thermic Typic Hapludults
Mountainburg	Loamy-skeletal, siliceous, thermic Lithic Hapludults
Nauvoo	Fine-loamy, siliceous, thermic Typic Hapludults
*Nella	Fine-loamy, siliceous, thermic Typic Paleudults
Sidon	Fine-loamy, siliceous, thermic Typic Fragiudults
Spadra	Fine-loamy, siliceous, thermic Typic Hapludults
Steprock	Loamy-skeletal, siliceous, thermic Typic Hapludults
Taft	Fine-silty, siliceous, thermic Glossaquic Fragiudults

* The soil is a taxadjunct to the series. See text for description of those characteristics of the soil that are outside the range of the series.

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